

SIMATIC NET

Operating Instructions for SCALANCE X-400 Industrial Ethernet Switches

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C79000-G8976-C186-03

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Classification of Safety-Related Notices

This document contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger:



Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.



Warning

indicates that death or severe personal injury **can** result if proper precautions are not taken.



Caution

with warning triangle indicates that minor personal injury can result if proper precautions are not taken.

Caution

without warning triangle indicates that damage to property can result if proper precautions are not taken.

Notice

indicates that an undesirable result or status can occur if the relevant notice is ignored.

Note

highlights important information on the product, using the product, or part of the documentation that is of particular importance and that will be of benefit to the user.

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Disclaimer

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcome.

C79000-G8976-C186-03
Technical data subject to change.

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Safety Instructions Regarding your Product

Before you use the product described here, read the safety instructions below thoroughly.

Notice

When using a SCALANCE X-400 in the ring (HSR, High Speed Redundancy), check the *RM* DIL switch before closing the ring cable. If the SCALANCE X-400 adopts the function of a redundancy manager, the switch must be set to *ON*. If the SCALANCE X-400 is not being used as a redundancy manager, the switch must be set to *OFF*.

Notice

When using a SCALANCE X-400 in redundancy manager mode (*RM* = *ON*), check whether the DIL switches *R1* and *R2* select the required ring ports before closing the ring. If ports other than those set are connected to the ring, they cause a ring short-circuit and overload the network.

Notice

When supplied, the DIL switches *R1* and *R2* are set to *OFF*. This means that the gigabit ports on slot 5 are defined as ring ports and ring redundancy is activated. In this case, you cannot activate rapid spanning tree / spanning tree.

Notice

If a device is replaced, remember the following points relating to a SCALANCE X-400 switch:

- Make the same settings on the DIL switches as they were on the old device.
 - Make sure that you use a media module and extender configuration that is identical to that of the old device.
 - Use the C-PLUG of the old device in the new one so that your device configuration is adopted.
-

Personnel Qualification Requirements

Only qualified personnel should be allowed to install and work on this equipment. Qualified personnel as referred to in this manual or in the warning notes are defined as persons who are familiar with the installation, assembly, startup and operation of this product and who possess the relevant qualifications for their work, e.g.:

- Training in or authorization for connecting up, grounding or labeling circuits and devices or systems in accordance with current standards in safety technology
- Training in or authorization for the maintenance and use of suitable safety equipment in accordance with current standards in safety technology
- First aid qualification

Correct Usage of Hardware Products

Please note the following regarding the correct usage of hardware products:

Caution

This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly and operated and maintained as recommended.

Before you use the supplied sample programs or programs you have written yourself, make certain that no injury to persons nor damage to equipment can result in your plant or process.

EU Directive: Do not start up until you have established that the machine on which you intend to run this component complies with the directive 89/392/EEC.

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Please note the following regarding the correct usage of software products:

Caution

This software may only be used for the applications described in the catalog or the technical description and only in connection with software products, devices, or components from other manufacturers which have been approved or recommended by Siemens.

Before you use the supplied sample programs or programs you have written yourself, make certain that no injury to persons nor damage to equipment can result in your plant or process.

Preface

Purpose of the Operating Instructions

These operating instructions describe the functions of the SCALANCE X-400 product line of modular Industrial Ethernet switches and support you during installation, commissioning and troubleshooting on site. You will find information on configuration in the separate *SCALANCE X-400 Configuration Manual*.

Validity of the Operating Instructions

These operating instructions are valid for the following products:

- Industrial Ethernet Switches SCALANCE X414-3E
order number: 6GK5 414-3FC00-2AA2
- Media module MM491-2
order number: 6GK5 491-2AB00-8AA2
- Media module MM491-2LD
order number: 6GK5 491-2AC00-8AA2
- Media module MM492-2
order number: 6GK5 492-2AL00-8AA2
- Media module MM492-2LD
order number: 6GK5 492-2AM00-8AA2
- Extender module EM495-8
order number: 6GK5 495-8BA00-8AA2
- Extender module EM496-4
order number: 6GK5 496-4MA00-8AA2

Further Documentation

For help on configuration and diagnostics using Web-based management, the CLI command line, or SNMP, refer to the following documentation:

- SCALANCE X-400 Configuration Manual
C79000-G8976-C187-01

This documentation is available on the Internet at
<http://support.automation.siemens.com/WW/view/en/19625108>

- SIMATIC NET Twisted Pair and Fiber-Optic Networks
C79000-G8976-C125-02

This documentation is available on the Internet at
<http://support.automation.siemens.com/WW/view/en/8763736>

Standards and Approvals

The devices of the SCALANCE X-400 product line meet the requirements for CE marking. For more detailed information, refer to the appendix of these Operating Instructions.

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Introduction to Industrial Ethernet Switches

1

1.1 Basic Information

Switching

With switching technology, data packets are forwarded directly from the input port to the appropriate output port during data exchange based on the address information. Switches operate on a direct delivery basis.

Essentially, switches have the following functions:

- **Connection of Collision Domains / Subnets**
Since repeaters and star couplers (hubs) operate at the physical level, their use is restricted to the span of a collision domain. Switches connect collision domains. Their use is therefore not restricted to the maximum span of a repeater network. On the contrary, switches allow extremely large networks with spans of 150 km to be set up and when using LD modules, even up to 1300 km.
- **Containing Load**
By filtering the data traffic based on the Ethernet (MAC) addresses, local data traffic remains local. In contrast to repeaters or hubs, which distribute data unfiltered to all ports / network nodes, switches operate selectively. Only data intended for nodes in other subnets is switched from the input port to the appropriate output port of the switch. To make this possible, a table assigning Ethernet (MAC) addresses to output ports is created by the switch in a "teach-in" mode.
- **Limitation of Errors to the Network Segment Affected**
By checking the validity of a data packet on the basis of the checksum which each data packet contains, the switch ensures that bad data packets are not transported further. Collisions in one network segment are not passed on to other segments.

The Need for Industrial Ethernet Switches

With over 80% of LANs based on Ethernet, this is the most commonly used technology. The use of switches is particularly important: They allow extensive networks with large numbers of nodes to be set up, increase the data throughput and simplify network expansion.

The modular SCALANCE X-400 Industrial Ethernet switches from SIMATIC NET are designed for use in high-performance networks that will also meet future requirements. Thanks to their modular design, the switches can be adapted to the task in hand in terms of number of ports and transmission medium. Support of Office standards makes the smooth integration of automation networks in existing office networks possible.

The devices are designed for use in switching cubicles and cabinets.

Technical Options (network topologies)

The modularity of SCALANCE X-400 switches simplifies the expansion of a network regardless of the network topology.

You can use a SCALANCE X-400 in the following network topologies:

- Ring with redundancy manager
- Star structure
- Line structure

The maximum cable length is 26 km for single mode fast Ethernet transmission and 10 km for single mode gigabit transmission. Mixed operation within the topology, for example between SCALANCE X414-3E and OSMs/ESMs is possible regardless of the structure being used (ring with redundancy manager, star, or line structure).

Using the SCALANCE X-400 as the redundancy manager in a ring with redundancy manager provides greater availability. If there is an interruption on the connection between these switches, the SCALANCE X-400 used as redundancy manager acts like a switch and in a very short time creates a line from the ring with redundant manager. As a result, a functional, end-to-end structure is restored.

1.2 Topologies

1.2.1 Ring with Redundancy Manager

To increase the availability, optical or electrical line topologies of up to 50 switches (SCALANCE X-400, SCALANCE X-200, or OSM/ESM) can be closed with a SCALANCE X414-3E to form a ring.

Functional Description

With a SCALANCE X414-3E operating as a redundancy manager, the two ends are closed to form a ring with redundancy manager. The redundancy function is activated or deactivated by switches on the Switch CPU.

In contrast to the ring ports of the other switches, the ring ports of the redundancy manager are disconnected when the network is operating problem-free. The SCALANCE X414-3E working in redundancy manager mode monitors the connected line over its ring ports and connects the ring ports if there is an interruption on the connected line; in other words, it restores a functioning line over this substitute path. Reconfiguration is achieved within 0.3 s. As soon as the problem is eliminated, the original topology is restored; in other words, the ring ports in the redundancy manager are disconnected from each other again.

In a ring with redundancy manager, there can only be one switch configured as a redundancy manager.

Connection of Other Network Segments or End Devices

At all ports of slots 9 to 11 or at the ports of a twisted pair extender module of the SCALANCE X414-3E as well as at all other switches in the ring with redundancy manager, further end devices or entire subnets can be attached using twisted pair cable (TP cable).

The use of a media module extender in the redundancy manager and in all other switches in this network structure provides the option of connecting further end devices or complete subnets with FO cable.

Electrical Ring

A redundant electrical ring with redundancy manager can be set up without media modules since the basic device provides two RJ-45 jacks on slot 5 that allow connection of electrical (twisted pair) connections (10, 100, 1000 Mbps). The factory setting defines the two ports on slot 5 as ring ports.

Optical Ring

An optical ring with redundancy manager is only possible with media modules. Which slots or ports should be used, depends on the selected transmission rate. The ports that can be used as ring ports are located on the media modules that can be used in slots 5, 6 and 7. As an alternative to optical gigabit transmission, the two ports on slot 6 or the first ports of slot 6 and 7 can be configured as ring ports for an optical fast Ethernet connection.

- Slot 5
equipped with MM492-2 or with MM492-2LD allows the ring to be operated as an optical gigabit ring with redundancy manager.
- Slot 6 / slot 6 and 7 (in each case only port 1)
equipped with MM491-2 or with MM491-2LD allows operation of an optical fast Ethernet ring with redundancy manager.

Configuration Example

Sample configurations with SCALANCE X414-3E, SIMATIC S7-200/300/400, operator control and monitoring system, H system and PC as end devices.

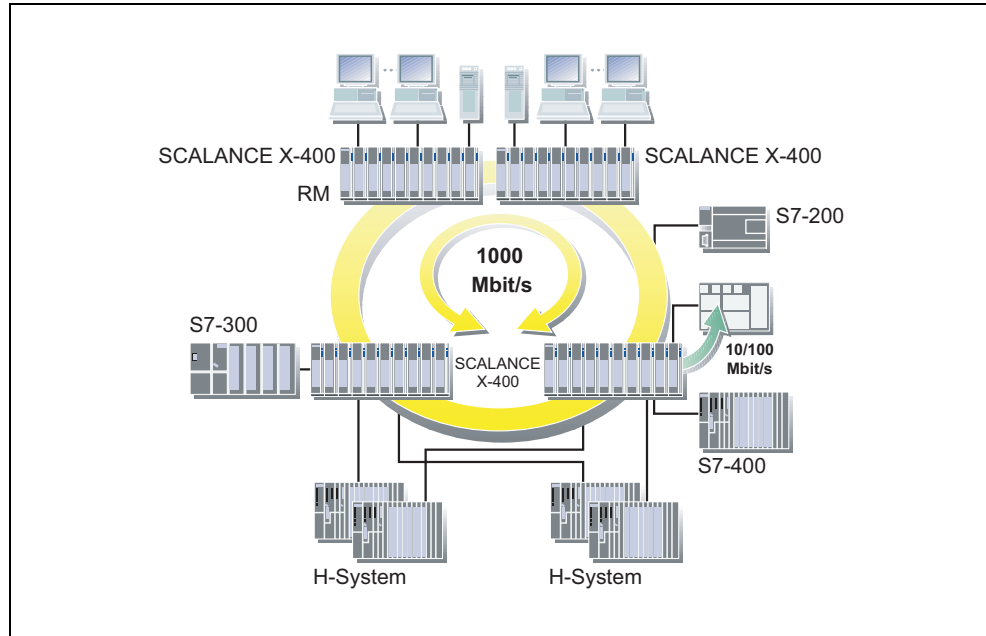


Figure 1-1 Gigabit ring with redundancy manager (RM)

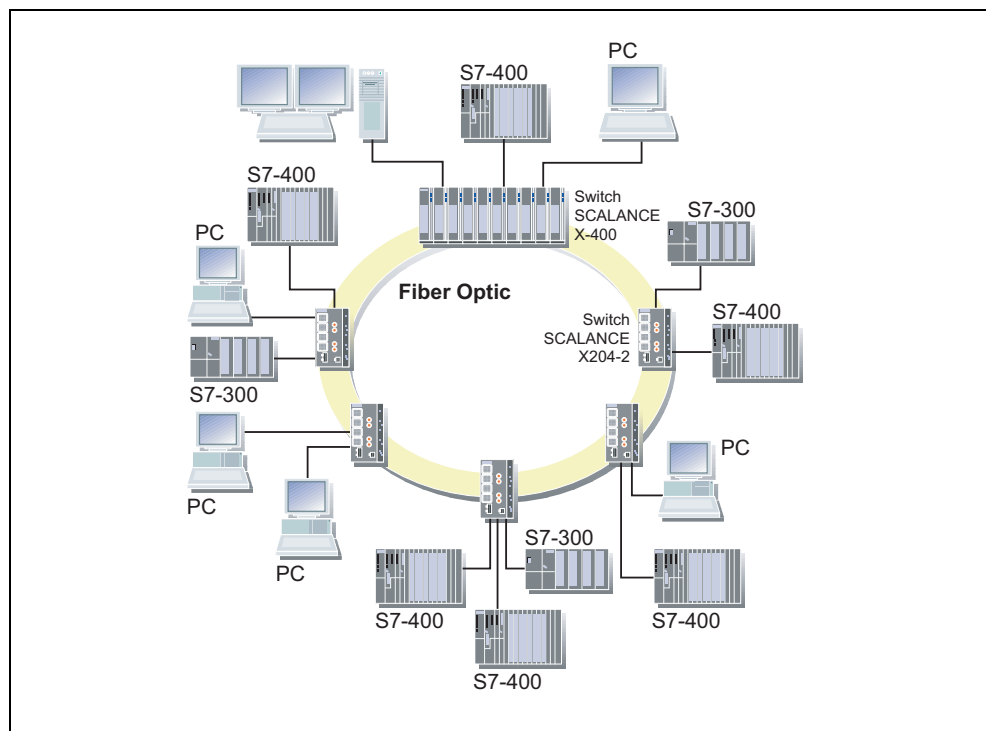


Figure 1-2 Ring with FO cable and redundancy manager

1.2.2 Star Structure

Functional Description

Star structures can be implemented with the SCALANCE X414-3E. The cascading depth and total span of a network are limited only by the signal propagation times of the communication connections.

Properties of a Star Structure

Each SCALANCE X414-3E communicates over a TP or FO cable with a central switch with which all other switches are also connected within a star structure. Communication is possible over the optical ports in slots 5, 6, or 7 or over the electrical ports in slots 5 and 9 to 11. With the fault mask, it is possible to monitor the port states using the signaling contact. In addition to connecting the switches to the central SCALANCE X414-3E, it is also possible to connect one or more end devices.

Configuration Example

Sample configurations electrical / optical with SCALANCE X-400, SCALANCE X-200, SIMATIC S7-300/400, SIMATIC ET 200 and operator panel as end devices.

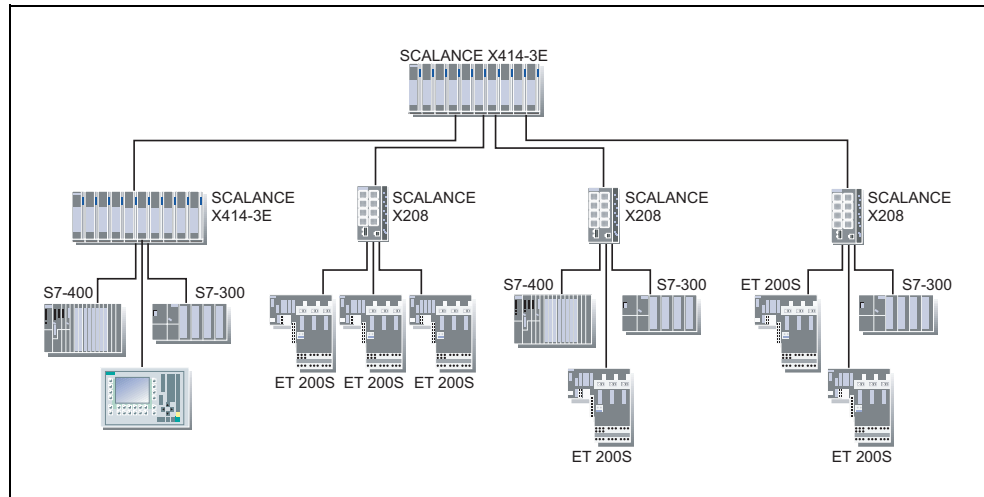


Figure 1-3 Star structure (Electrical)

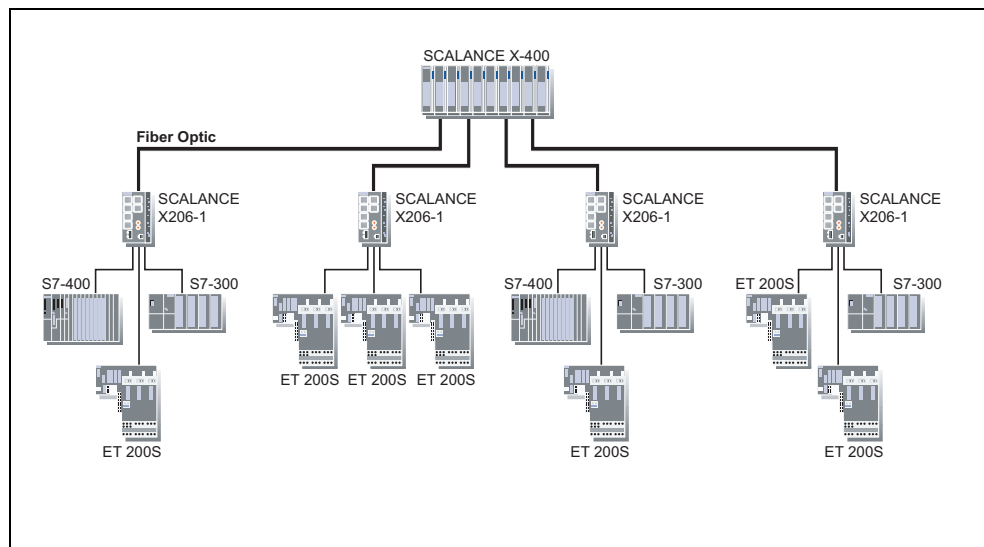


Figure 1-4 Star structure (Optical)

1.2.3 Line Structure

Functional Description

Line structures can be implemented with the SCALANCE X414-3E. The cascading depth and total span of a network are limited only by the signal propagation times of the communication connections.

Properties of the Line Structure

Each SCALANCE X414-3E communicates over a TP or FO cable with a neighboring switch. Communication is possible over the optical ports in slots 5, 6, or 7 or over the electrical ports in slots 5 and 9 to 11. With the fault mask, it is possible to monitor the port states using the signaling contact. In addition to interconnecting the switches, it is also possible to connect one or more end devices to every SCALANCE X414-3E.

Configuration Example

Sample configuration with SCALANCE X414-3E, SIMATIC S7-300/400 and operator panel as end devices.

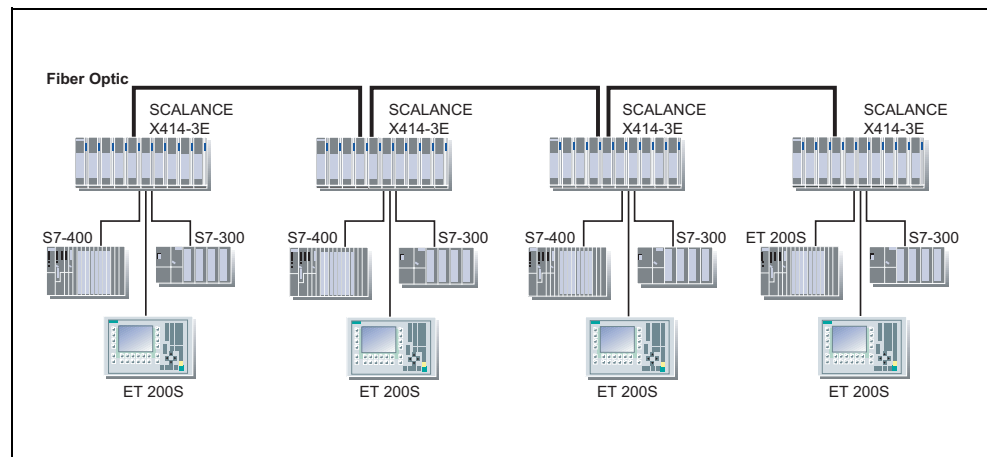


Figure 1-5 Line structure (Optical)

1.2.4 Redundant Linking of Network Segments

The example of redundant linking of two network segments as shown here is possible only when linking between X414 because the standby function of the X414 is required.

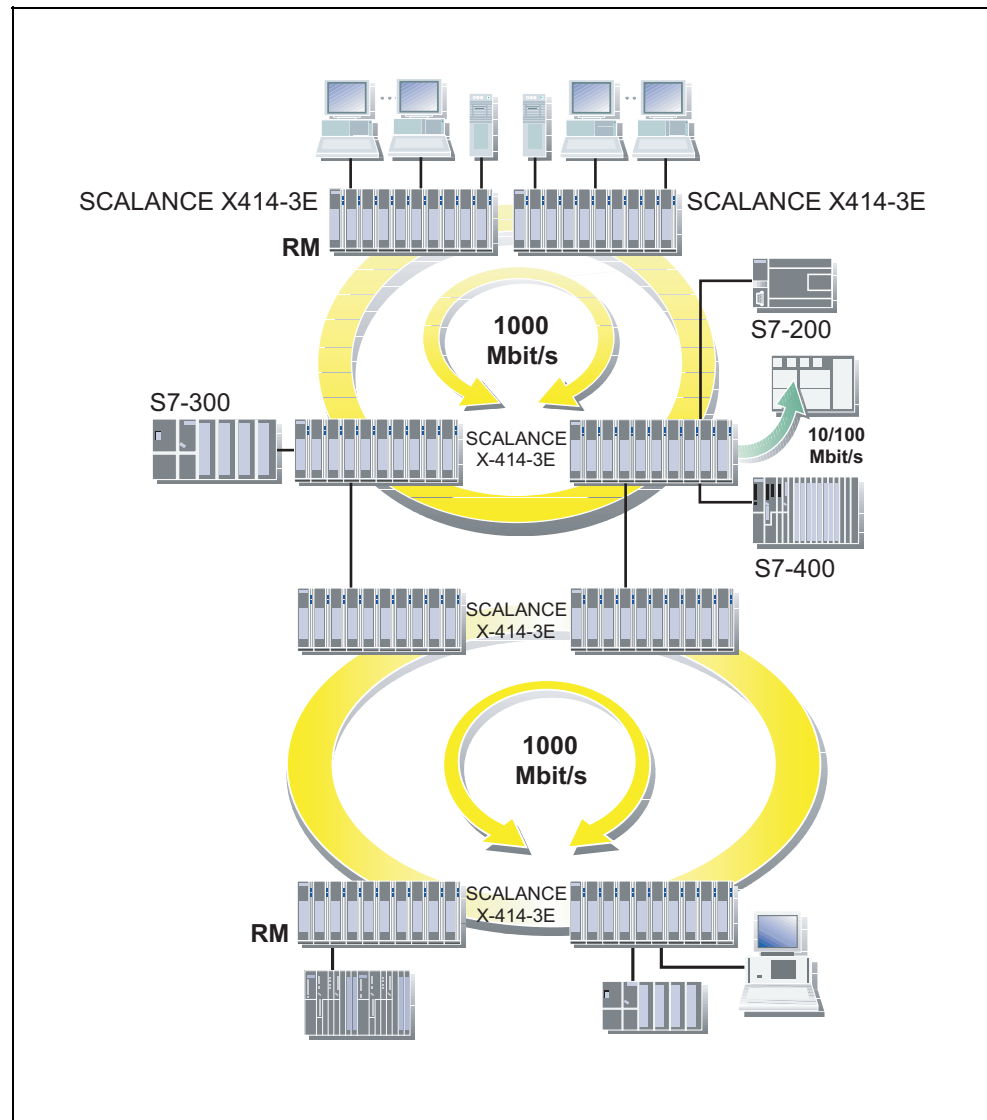


Figure 1-6 Redundant linking of two subnets

In this case, network segments are rings with a redundancy manager (RM). The rings can also be interrupted at one point (linear topology).

For a redundant link as shown in the figure, two devices must be configured within a network segment. This configuration is set in Web Based Management, Command Line Interface or using SNMP access. For more detailed information, refer to the *Configuration Manual SCALANCE X-400 Industrial Ethernet Switches*.

The two devices connected in the configuration exchange data frames with each other to synchronize their operating statuses (one device is master and the other slave). If there are no problems, only the link from the master to the other network segment is active. If this link fails (for example due to a link-down or a device failure), the slave activates its link as long as the problem persists.

System Description of SCALANCE X-400

2

2.1 Properties, Functionality and Features of SCALANCE X-400

This chapter explains special properties, features and options available to you with the SCALANCE X-400 product line.

The basic device consists of the frame, the power supply, digital inputs and a Switch CPU.

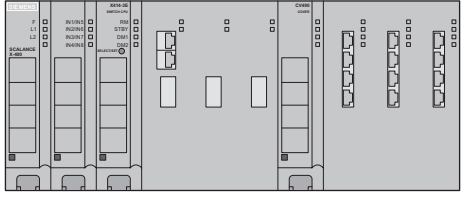
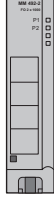
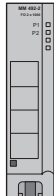
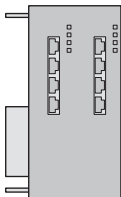
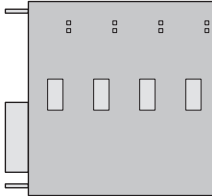
SCALANCE X-400 provides a modular structure for the required ports. This modularity simplifies setup and subsequent expansion of complex network topologies to meet current needs.

- **Gigabit technology**
The basic device has ports with a transmission rate of 1 Gbps for electrical cables (twisted pair) or by adding a gigabit media module for fiber-optic cables (FO).
- **With SCALANCE X-400, it is possible to split the ring ports into two different slots (fast Ethernet module - slots 6 and 7).** If one of the media modules fails, operation can be maintained as a line structure. A defective module can be replaced during operation.
- **Diagnostics**
Remote diagnostic options are available with Web-based management, TelNet, or SNMP.
- **The basic device has a signaling contact for local operator control.**
- **An Ethernet interface is available for diagnostics and management purposes.**

- **C-PLUG**
When replacing a device, the C-PLUG can be removed and inserted in the new device so that the configuration can be retained.
- **VLAN**
SCALANCE X-400 has port-based support of virtual networks (VLAN). A physical network can be divided into several virtual networks. This results in less network load compared with other defined VLANs.
- **Spanning Tree / Rapid Spanning Tree**
SCALANCE X-400 can process both the Spanning Tree Protocol (STP) and the Rapid Spanning Tree Protocol (RSTP). This prevents circulating packets and, in the event of a link going down, quickly provides an alternative path. With the spanning tree protocol, the reconfiguration time is between 20 and 30 seconds, with rapid spanning tree, it is approximately one second. Spanning tree / rapid spanning tree is disabled as default.

Components of SCALANCE X-400

The following table shows the components of SCALANCE X-400:

Component	Function	Figure
Basic device consisting of <ul style="list-style-type: none"> ▪ Backplane ▪ Power module ▪ DI module ▪ Switch CPU ▪ Two 1000BaseTX interfaces ▪ Twelve 100BaseTX interfaces ▪ Extender interface 	<p>The power module converts the 24 V input power into the internal operating voltage of the basic device.</p> <p>There are eight digital inputs for feeding in external signals.</p> <p>The Switch CPU manages the data traffic. The CPU also has a serial and an Ethernet port.</p>	 <p>For example SCALANCE X414-3E</p>
Media module fiber-optic 1000 Mbps	Expands the basic device by two gigabit fiber-optic ports.	 <p>For example MM492-2</p>
Media module 100 Mbps	Expands the basic device by two fast Ethernet fiber-optic ports.	 <p>For example MM491-2</p>
Twisted pair extender	Expands the basic device by eight fast Ethernet ports with RJ-45 jacks.	 <p>EM495-8</p>
Media module extender	Expands the basic device by four slots for fast Ethernet media modules.	 <p>EM496-4</p>

2.2 Ports of SCALANCE X-400

SCALANCE X-400 provides you with electrical ports that can be used as gigabit and ring ports. The expansion with media modules provides you with additional optical ports. By using an extender module, you can increase the number of ports by a maximum of eight ports.

2.2.1 10Base-T / 100Base-TX

Transmission Rate

The transmission rate of the electrical ports is 10 Mbps or as fast Ethernet ports 100 Mbps.

Transmission Mode

The transmission mode for 10Base-T / 100Base-TX is specified in the IEEE 802.3i / IEEE 802.3u standards of the Institute of Electrical and Electronic Engineers.

Autonegotiation (automatic detection of the best transmission modes) is standard. The order in which they are selected is:

- 100Base-TX full duplex
- 100Base-TX half duplex
- 10Base-T full duplex
- 10Base-T half duplex

Two communication modes are possible:

- Half duplex mode
two-way alternate - it is only possible to either send or receive over the interfaces at any one time.
- Full duplex mode
two-way simultaneous - both communication partners can send and receive at the same time.

Connections to other switches can use half or full duplex; connections to hubs are possible only in half duplex mode.

Transmission medium

Data transmission at 10 Mbps and at 100 Mbps is over two wire pairs (pin 1, 2, 3, 6) of the twisted pair cable. For 10 Mbps, at least a category 3 (Cat 3) and for 100 Mbps, at least a four wire cable (2x2) is necessary.

Transmission range

The maximum transmission distance (segment length) is 100 m.

Connectors

The connectors used are 8-pin RJ-45 jacks with securing collars. The securing collar in conjunction with the cover ensures a flush fit and the locking mechanism with the PROFINET-compliant male connector IE FC RJ-45 Plug 180 provides a rugged node attachment suitable for an industrial environment that provides strain and bending relief for the RJ-45 jack.

2.2.2 1000Base-TX

Transmission Rate

The transmission rate of the electrical gigabit ports is 1 Gbps.

Transmission Mode

The transmission mode for 1000Base-TX is specified in the IEEE 802.3ab standard.

At 1 Gbps, autonegotiation is optional.

Two communication modes are possible:

- Half duplex
- Full duplex

Transmission Medium

Data is transmitted over an 8-wire twisted pair cable.

Notice

For data transmission at 1 Gbps, at least Cat 5e twisted-pair cabling with 4x2 wires is required. With a four wire cable (2x2), the maximum possible data rate is 100 Mbps.

Transmission Range

The maximum transmission distance (segment length) is 100 m.

Connectors

The connectors used are 8-pin RJ-45 jacks.

2.2.3 100Base-FX

Transmission Rate

The transmission rate of the optical fast Ethernet ports is 100 Mbps.

Transmission Mode

Transmission with 100Base-FX is defined in the IEEE 802.3u standard and is specified as 100 Mbps transmission rate and full duplex.

Transmission Medium

Data transmission is over multimode or single mode fiber-optic cable (FOC). The wavelength is 1310 nm.

Two FOC types can be used:

- Multimode FOC
The core diameter is 50 µm; the light source is an LED. Many modes (light beams) are used for signal transmission. The propagation times of the light pulses (dispersion) restrict the maximum range considerably.
- Single mode FOC
The core diameter is 9 or 10 µm; the light source is a laser diode. To transmit a signal, only one mode (light beam) is used greatly reducing dispersion. As a result, the maximum range of single mode FOC is greater than that of multimode FOC.

Regardless of the type used, the outer diameter of the FOC is 125 µm.

Transmission Range

The maximum transmission range (segment length) depends on the module selected and the FOC. The range is as follows:

- 100Base-FX module and multimode GFOC: 3 km
- 100Base-FX-LD module and single mode FOC: 26 km

Connectors

BFOC connectors are used.

2.2.4 1000Base-SX

Transmission Rate

The transmission rate of the optical gigabit ports is 1 Gbps.

Transmission Mode

Transmission with 1000Base-FX is defined in the IEEE 802.3z standard and is specified as 1000 Mbps transmission rate and full duplex.

Transmission Medium

Data is transmitted over multimode FOC. The wavelength is 850 nm.

The core diameter of the multimode FOC is 50 µm; the light source is an LED. Many modes (light beams) are used for signal transmission. The propagation times of the light pulses (dispersion) restrict the maximum range considerably.

Transmission Range

The maximum transmission range (segment length) is 750 m when using SIMATIC NET fiber-optic multimode FOC with SC duplex connectors.

Connectors

SC duplex female connectors are used.

2.2.5 1000Base-LX

Transmission Rate

The transmission rate of the optical gigabit ports is 1 Gbps.

Transmission Mode

Transmission with 1000Base-LX is defined in the IEEE 802.3z standard and is specified as 1000 Mbps transmission rate and full duplex.

Transmission Medium

Data is transmitted over single mode FOC. The wavelength is 1310 nm.

The core diameter of the single mode FOC is 9 or 10 μm ; the light source is a laser diode. To transmit a signal, only one mode (light beam) is used greatly reducing dispersion. As a result, the maximum range of single mode FOC is greater than that of multimode FOC.

Transmission Range

The maximum transmission range (segment length) is 10 km for single mode FOC.

Connectors

SC duplex female connectors are used.

2.3 Compatibility of SCALANCE X-400

Compatibility List

The following products and devices are compatible with SCALANCE X-400:

- **End devices**
All SIMATIC NET products with a TP port can be connected to the ports of SCALANCE X-400 Industrial Ethernet Switches.
- **Network components in a line or star structure**
 - ESM/OSM
 - OMC (TP cable max. 6 m long)
 - SCALANCE X-100
 - SCALANCE X-200
 - SCALANCE X-200IRT
 - SCALANCE W-700
- **Network components in a ring structure with SCALANCE X-400 as RM**
 - ESM/OSM
 - SCALANCE X-200
 - SCALANCE X-200IRT
- **Redundant linking of 100 Mbps networks over FO cable.**
The redundant optical linking of networks is allowed only with the devices ITP 53 with order number 6GK1 105-2AD10 and the OSM BC 08 with order number 6GK1 105-4AA00 (using the ESM/OSM function *standby master* and *standby slave*).

Note

All compatibility information assumes the correct use of the TP and FOC cables.

Product Description of SCALANCE X-400

3

3.1 SCALANCE X414-3E Basic Device

Overview

The SCALANCE X-400 product line consists of modular Industrial Ethernet switches, media modules and extenders. 100 Mbit and 1000 Mbit technology is supported for different transmission media (twisted pair, fiber-optic) and increased port requirements. The main areas of application are high-performance plant networks. Due to its modular structure, the X-400 product line is designed to meet future demands and can be adapted to meet the requirements of a particular task.

The SCALANCE X414-3E switch has two integrated gigabit Ethernet twisted pair ports (100 or 1000 Mbps) to interconnect multiple switches. The nodes are connected over 12 fast Ethernet ports integrated in the switch (10 or 100 Mbps).

The integrated redundancy manager allows fast medium redundancy both for gigabit Ethernet and for fast Ethernet even in large networks.

To set up optical gigabit networks, both integrated gigabit Ethernet ports can be converted to fiber-optic cable over a 2-port gigabit Ethernet module. Module variants for multimode (up to 750 m) and single mode (up to 10 km) are available.



Figure 3-1 Basic device without media modules, protective caps and covers



Figure 3-2 Basic device with media modules and covers

Components of the Product

The following components are supplied with the SCALANCE X414-3E:

- Basic device with power module in slot 2,
DI module with eight digital inputs in slot 3
Switch CPU including C-PLUG in slot 4
Protective caps for media module terminal strips in slots
5, 6 and 7.
- 1 CV490 2x1000, cover of media module slot 5
2 CV490 2x100, cover of media module slots 6 and 7
1 CV490 Cover, dummy cover for slot 8
3 CV490 4x100, cover for slots 9 to 11
- SIMATIC NET Manual Collection CD
- Slot labels for slots 1 through 18
- 1 connector for power supply (4-pin)
- 1 connector for signaling contact (4-pin)
- 2 connectors for digital inputs (5-pin)
- 1 sheet with 15 labeling strips

Spares

- 1 C-PLUG (order number: 6GK1 900-0AB00)
- 7 covers for slots (order number: 6GK5 490-0AA00-0AA2)
 - 1 cover for slot 5 (1 Gbps - TP)
 - 2 covers for slots 6 and 7
 - 1 dummy cover for slot 8
 - 3 covers for slots 9 to 11 (100 Mbps - TP)
- Terminal set (order number: 6GK5 498-1AA00-0AA0)
 - 10 connecting terminals for PS and signaling contact 4-pin
 - 10 connecting terminals digital inputs 5-pin
- 1 location label (order number: 6ES7 912-0AA00-0AA0)
- 10 sheets of labels (A4) each with 15 labeling strips (order number: 6GK5 498-0AA00-0AA0)

Slots

The SCALANCE X414-3E basic device consists of a backplane with three permanently installed modules in slots 2, 3 and 4.

Power Module	Digital Inputs	Switch CPU	2 x RJ45 10/100/1000 MBit/s Twisted Pair				4 x RJ45 10/100/ MBit/s Twisted Pair	4 x RJ45 10/100/ MBit/s Twisted Pair	4 x RJ45 10/100/ MBit/s Twisted Pair
2	3	4	5	6	7	8	9	10	11

Figure 3-3 Basic device without media modules with existing ports

The modules in the individual slots have the following function (slot 1 is reserved for a power supply unit):

- **Slot 2**

Power module

The input voltage of 24 V DC is transformed to the internal supply voltage. The module has two 4-pin sockets for connecting a redundant power supply and for connecting the signaling contact and protective earth.

- **Slot 3**

Digital input module

The input module has two 5-pin sockets for connecting eight digital inputs that allow different signaling modes.

- **Slot 4**

CPU module

- Contains the processor that provides the management functionality.
- C-PLUG for storage of parameter assignment.
- DIL switch for the redundancy manager function and to specify the ring ports.
- SELECT/SEL button for switching over the display modes, for resetting to the factory default settings and to define the fault mask.
- LED display of the display modes DMode A through DMode D.

- **Slot 5**

Contains two RJ-45 jacks allowing attachment of electrical (twisted pair) connections (10, 100, 1000 Mbps).

As an option, slot 5 allows the use of an optical gigabit module with two ports (1000Base-SX or 1000Base-LX).

- **Slots 6 and 7**

Optional use of two optical fast Ethernet modules (100 Mbps) each with two ports (100Base-FX).

- **Slot 8**

No function in system.

- **Slot 9 through 11**

Each contains four RJ-45 jacks allowing attachment of 12 electrical (twisted pair) connections in total (10, 100 Mbps).

These cannot be used by media modules.

The basic version of the SCALANCE X414-3E without expansion with media modules provides 14 ports. The two ports in slot 5 can be used as ring ports.

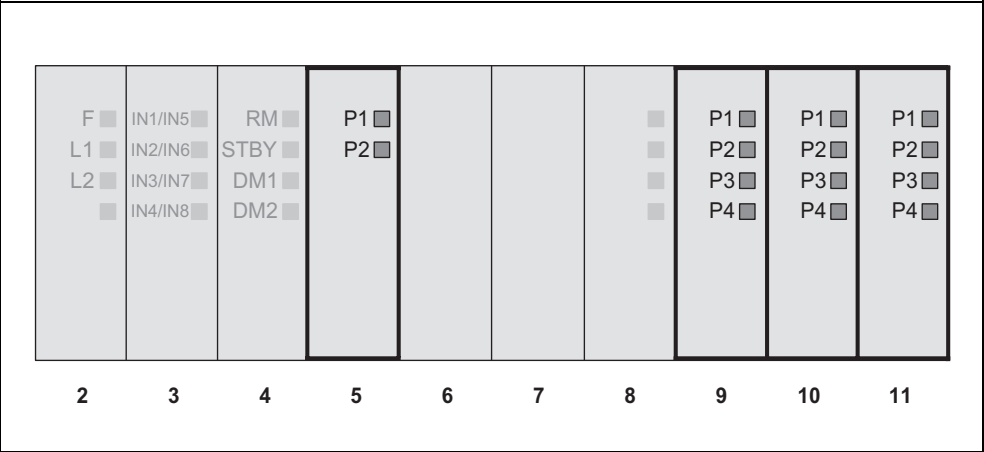


Figure 3-4 Ports of the SCALANCE X414-3E

By inserting media modules in slots 6 and 7, you have 4 further optical ports available either as ring ports or as end device ports.

By docking an extender module to the right of slot 11, you can extend the basic device by a further 8 ports. There are two types of extender available, one for twisted pair ports and one for fiber-optic ports. The twisted pair extender is double the width of a media module and the media module extender is four times the width.

3.1.1 Power Module

The power module is inserted in slot 2.
 The power can be fed into the power module redundantly over two inputs. The two power inputs are isolated from each other, there is no power distribution. If redundant power feed-in is used, the switch is supplied solely by the section of the power module with the higher output voltage.

The front 4-pin connector is used for the power supply. The input voltage is 24 V DC (20.4 – 28.8 V). The signaling contact supplies the fault status at the rear 4-pin connector. If there is a fault, the contact opens.

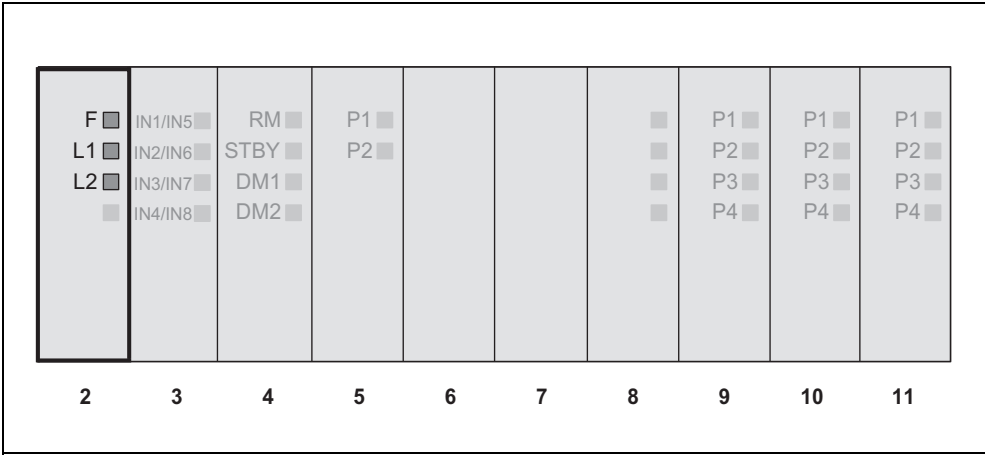


Figure 3-5 Slot of the power module

Signaling Contact

The following can be signaled over a floating signaling contact:

- **Failure of the power supply.**
The power supply monitored is selected in the fault mask.
- **Bad link status of a port.**
(wrong connector or no connection to partner device). The port monitored is selected in the fault mask.
- **Change to the DIL switch during operation.**
Possible inconsistency between the switch setting and the actual operating state, The switch setting is adopted only after a restart.

If the SCALANCE X414-3E is set as the redundancy manager, the following errors are also reported:

- Bad link status of the ring ports, regardless of the status of the fault mask.
- Configuration of a second SCALANCE X414-3E as redundancy manager in the same ring.

3.1.2 Digital Inputs

DI Module

The digital input module is located in slot 3 and provides the user with eight digital inputs. The cables are connected to the bottom of the module by two 5-pin connectors.

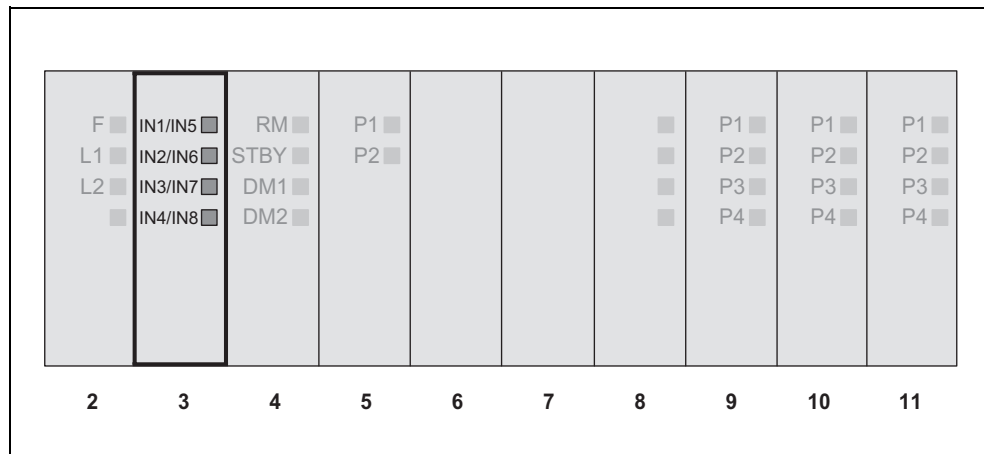


Figure 3-6 LEDs of the digital input module

Depending on the configuration, the states of the digital inputs can be used to send E-mails and/or entries to the logbook of the SCALANCE X414-3E.

It is also possible to read the statuses over SNMP.

3.1.3 Switch CPU

The Switch CPU is in slot 4.
The CPU has four DIL switches for configuring the device. This module also has four LEDs for displaying parameter assignments that can be modified by the user with the DIL switch and a SELECT / SET button.

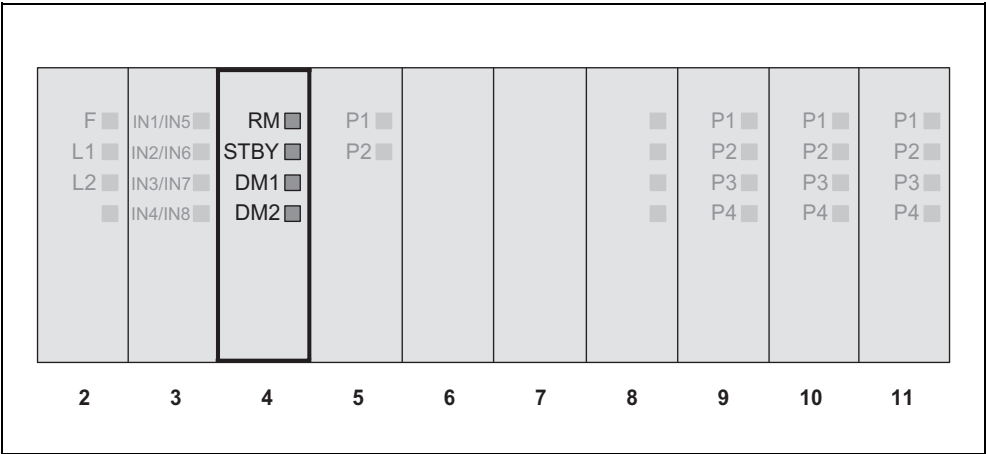


Figure 3-7 LEDs on the Switch CPU

Serial Port

The Switch CPU of the SCALANCE X414-3E has an RS-232 port. This is used for the following purposes:

- Firmware updates
- Management with the aid of the command interpreter (Command Line Interpreter, CLI) including setting of the IP address information.

Input to the command interpreter is over command lines.

For more detailed information, refer to the *SCALANCE X-400 Configuration Manual*.

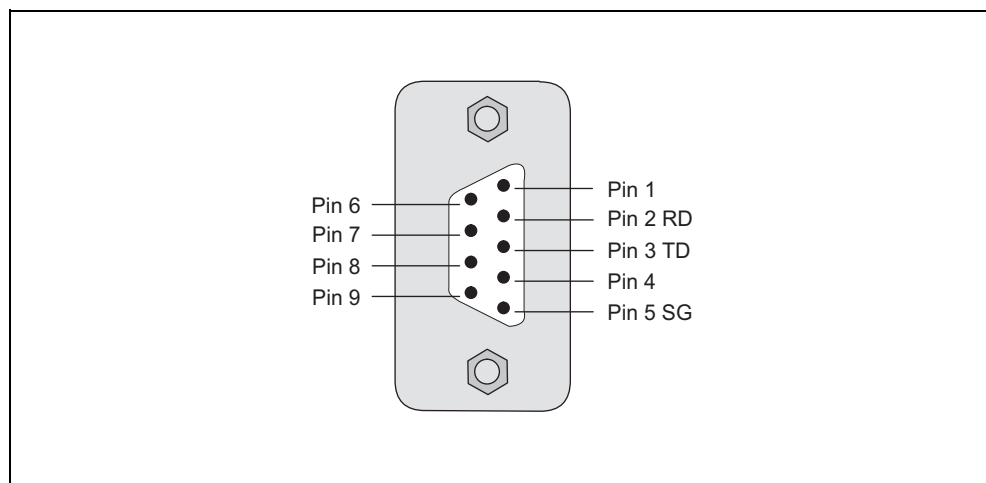


Figure 3-8 Pin assignment

Ethernet Port

On the bottom panel of the SCALANCE X414-3E, there is an 8-pin RJ-45 jack. This Ethernet interface can be used for productive communication with other switches or end devices. This is used for the following purposes:

- Configuration
- Commissioning

The SCALANCE X414-3E can be configured either locally or over a network.

For more detailed information, refer to the *SCALANCE X-400 Configuration Manual*.

3.1.4 C-PLUG (Configuration Plug)

Area of Application

The C-PLUG is an exchangeable medium for storage of the configuration data of the modular switch and ships with the product. This means that the configuration data remains available if the basic device is replaced.

Notice

The C-PLUG must only be removed or inserted when the power supply to the device is turned off.

How It Works

Power is supplied by the basic device. The C-PLUG retains all data permanently when the power is turned off.

If an empty C-PLUG (factory settings or deleted with the Clean function) is inserted, all the configuration data of the SCALANCE X414-3E is saved to it automatically when the device starts up. Changes to the configuration during operation are saved on the C-PLUG without operator intervention if this is in the *ACCEPTED* status.

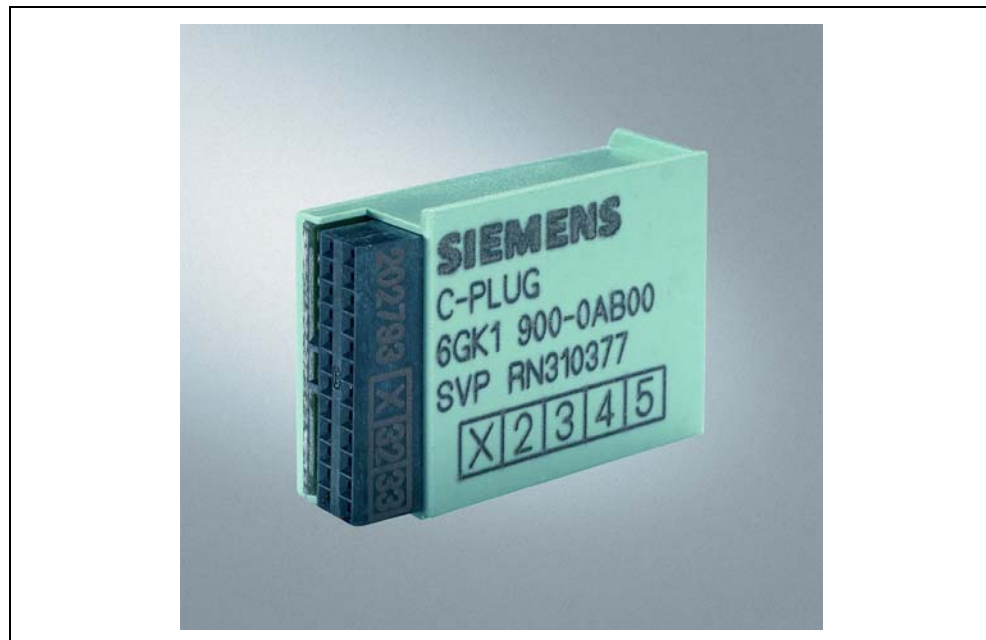


Figure 3-9 C-PLUG

A device with an accepted C-PLUG (ACCEPTED status) inserted uses the configuration data of the C-PLUG automatically when it starts up. Acceptance is possible only when the data was written by a compatible device type.

This allows a basic device to be replaced quickly and simply. The C-PLUG is taken from the failed component and inserted in the replacement. The first time it is started up, the replacement device has the same configuration as the failed device except for the MAC address set by the vendor.

Notice

If the SCALANCE X414-3E is replaced, the settings of the DIL switches on the Switch CPU and the configuration with media modules or extender modules must be duplicated.

Diagnostics

Inserting a C-PLUG that does not contain the configuration of a compatible device type, accidentally removing the C-PLUG or general malfunctions of the C-PLUG are signaled by the diagnostics mechanisms of the device (LEDs, WEB-based management, SNMP and CLI).

Startup Behavior

	C-PLUG	X414-3E Startup
1	not found	with internal configuration (if it exists) or with factory defaults.
2	empty	with internal configuration, immediately copies this automatically to the C-PLUG.
3	written with own X414-3E configuration data.	with C-PLUG configuration.
4	written with third-party X414-3E configuration data.	with third-party C-PLUG configuration.
5	written with configuration data of a different device type.	with internal configuration, red LED on power module and log entry.
6	defective	with internal configuration, red LED on power module and log entry.

In cases 1 and 2, the configuration data on the Switch CPU and the C-PLUG is identical. In cases 3 and 5 the configuration data is different and can be synchronized manually. In case 6, you can attempt to reformat the C-PLUG with the clean function. If problems persist, replace the C-PLUG.

Notice

In case 4 (replacing the switch), the DIL switch settings of the C-PLUG and not the physical switch settings are adopted. A deviation is signaled by the diagnostic options.

For more detailed information, refer to the *SCALANCE X-400 Configuration Manual*.

3.1.5 Ports

The SCALANCE X414-3E basic device provides two gigabit ports on slot 5 and four fast Ethernet ports on each of slots 9 through 11. The two ports on slot 5 can be used as ring ports.

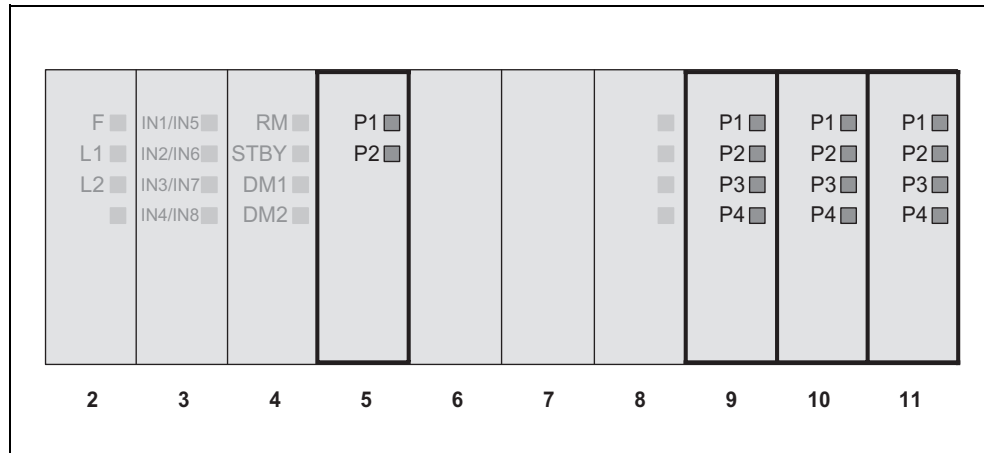


Figure 3-10 Ports on the basic device

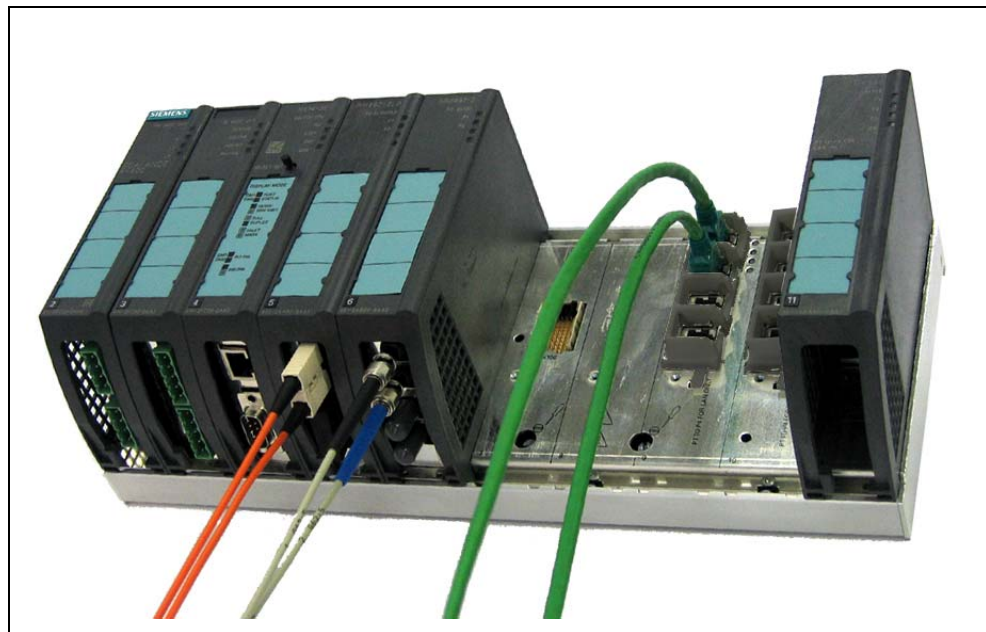


Figure 3-11 Basic device with gigabit fiber-optic cable, fast Ethernet fiber-optic cable and fast Ethernet twisted pair cable

Media Modules, Covers, Dummy Cover

4

4.1 Media Modules

Available Module Types

The following media modules are available to expand the basic device:

- MM491-2 (100 Mbps)
order number: 6GK5 491-2AB00-8AA2
- MM491-2LD (100 Mbps)
order number: 6GK5 491-2AC00-8AA2
- MM492-2 (1000 Mbps)
order number: 6GK5 492-2AL00-8AA2
- MM492-2LD (1000 Mbps)
order number: 6GK5 492-2AM00-8AA2

By using media modules, you can increase the number of available ports in the basic device SCALANCE X414-3E from 14 to 18. On six ports, data transmission is also possible over fiber-optic cable instead of TP cable.

Module Type	Procedure	Cabling	Connector	Segment Length	Wave-length
MM491-2	100Base-FX	Multimode	BFOC	3 km	1310 nm
MM491-2LD	100Base-FX	Single mode	BFOC	26 km	1310 nm
MM492-2	1000Base-SX	Multimode	SC duplex	750 m	850 nm
MM492-2LD	1000Base-LX	Single mode	SC duplex	10 km	1310 nm

Note

It is possible to insert and remove the media modules during operation. Before inserting a media module, remove the cover and cap from the slot. Please put these away for safe keeping. If you remove a media module, close the the terminal strip with the cap and and the slot with the cover.

Options for Slot 5

Slot 5 of the basic device has two RJ-45 jacks for connecting TP cables. The possible data transmission rates on electrical connections are 10, 100, or 1000 Mbps. An optical gigabit module in slot 5 allows data transmission with multimode or single mode FOC. In this case, the two RJ-45 jacks can no longer be used.

Options for Slots 6 and 7

Slots 6 and 7 do not have any ports but allow two optical fast Ethernet modules to be inserted each with ports. This gives you the opportunity of data transmission at a data transmission rate of 100 Mbps over multimode or single mode FOC.

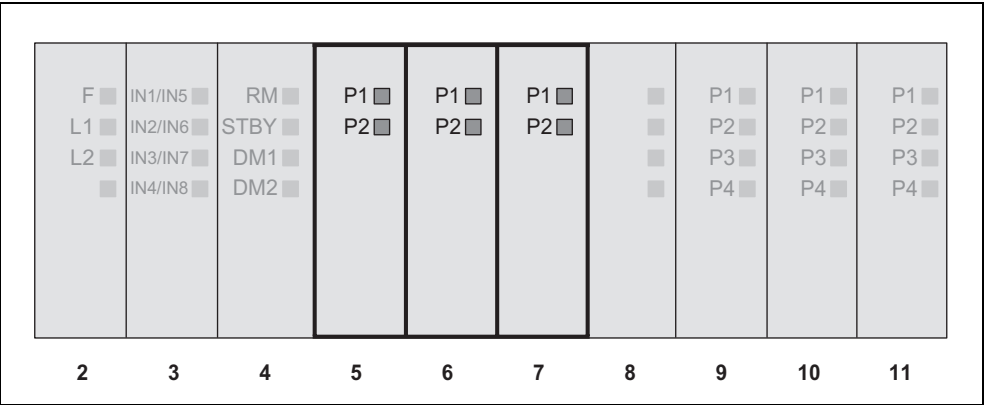


Figure 4-1 Slots for the media modules

4.1.1 Fast Ethernet Media Module MM491-2 (100Base-FX)

The fast Ethernet media module MM491-2 can be used optionally in slots 6 and 7 of the basic device and when using the media module extender EM496-4, it can also be used in slots 12 through 15. Mixed operation with the fast Ethernet media module MM491-2LD is possible.

Properties

The fast Ethernet media module provides two ports for connecting the multimode FOC. The signal is transmitted by LED with a wavelength of 1310 nm. The maximum cable length is 3 km.

Connector

The connectors are 2x2 BFOC sockets.

LED Display of the Fast Ethernet Media Module

The LED displays of the module are the same as the LEDs of the basic device. With optical transmission, a fixed transmission rate of 100 Mbps and full duplex mode is set. The display in display modes B and C is analogous.

- In display mode A, the current connection status is displayed.
- In display mode B, the fixed transmission rate is displayed.
- In display mode C, the full duplex mode is displayed.
- In display mode D, you can see whether or not the port is monitored.

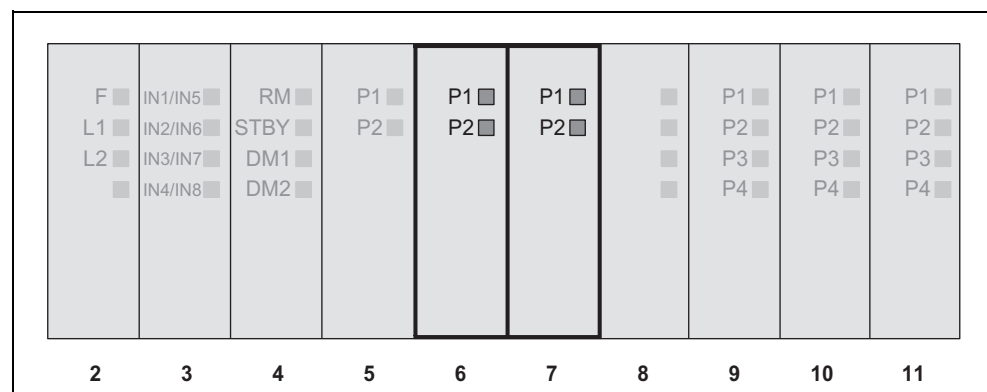


Figure 4-2 Slots of the MM491-2 media module

4.1.2 Fast Ethernet Media Module MM491-2LD (100Base-FX)

The fast Ethernet media module MM491-2LD can be used optionally in slots 6 and 7 of the basic device and when using the media module extender EM496-4, it can also be used in slots 12 through 15. Mixed operation with the fast Ethernet media module MM491 is possible.

Properties

The fast Ethernet media module provides two ports for connecting the single mode FOC. The signal is transmitted by laser diode with a wavelength of 1310 nm. The maximum cable length is 26 km.

Connector

The connectors are 2x2 BFOC sockets.

LED Display of the Fast Ethernet Media Module

The LED displays of the module are the same as the LEDs of the basic device. With optical transmission, only a fixed transmission rate and full duplex mode are possible. The display in display modes B and C is analogous.

- In display mode A, the current connection status is displayed.
- In display mode B, the fixed transmission rate is displayed.
- In display mode C, the full duplex mode is always displayed.
- In display mode D, you can see whether or not the port is monitored.

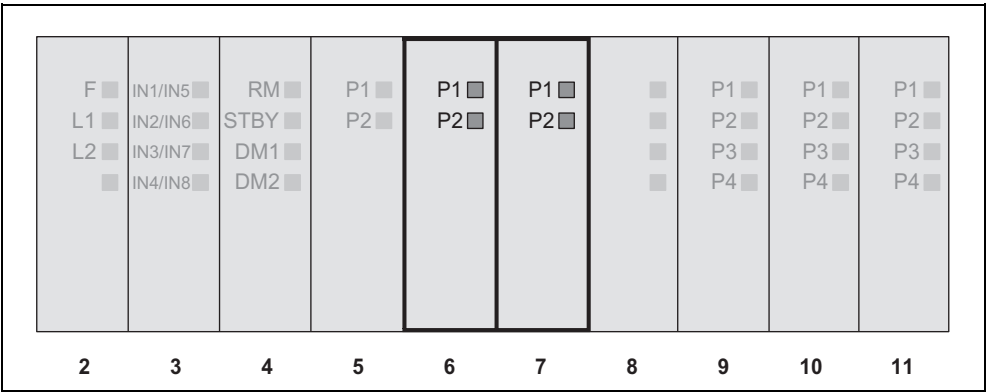


Figure 4-3 Slots of the MM491-2LD media module

4.1.3 Gigabit Media Module MM492-2 (1000Base-SX)

The MM492-2 gigabit media module can be inserted as an option in slot 5.

Properties

The gigabit media module provides two ports for connecting the multimode FOC. The signal is transmitted using an LED at a wavelength of 850 nm. Both ports of the module can be configured as ring ports. The maximum cable length is 750 m when using SIMATIC NET fiber-optic cables.

Connector

SC duplex female connectors are used.

LED Display of the Gigabit Media Module

The LED displays of the module are the same as the LEDs of the basic device. With optical transmission, only a fixed transmission rate and full duplex mode are possible. The display in display modes B and C is analogous.

- In display mode A, the current connection status is displayed.
- In display mode B, the fixed transmission rate is displayed.
- In display mode C, the full duplex mode is always displayed.
- In display mode D, you can see whether or not the port is monitored.

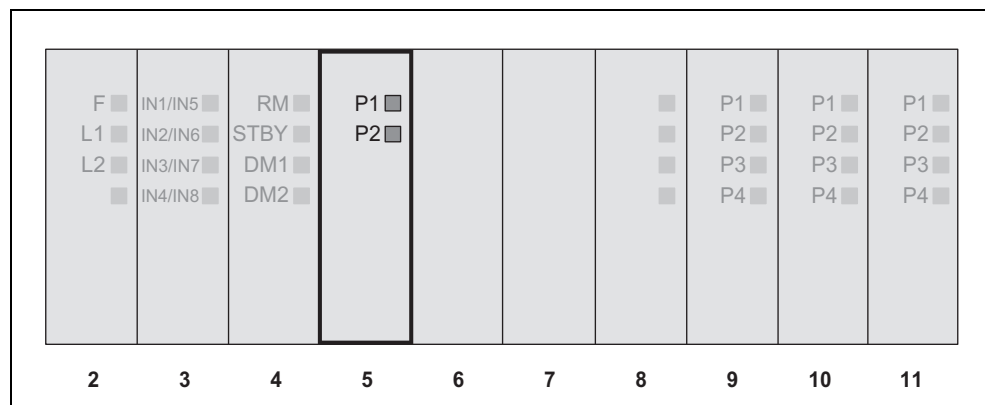


Figure 4-4 Slot of the MM492-2 media module

4.1.4 Gigabit Media Module MM492-2LD (1000Base-LX)

The MM492-2LD gigabit media module can be inserted as an option in slot 5.

Properties

The media module provides two ports for connecting the single mode FOC. Signal transmission uses a laser diode at a wavelength of 1310 nm. Both ports of the module can be configured as ring ports. The maximum cable length is 10 km when using SIMATIC NET fiber-optic cables.

Connector

SC duplex female connectors are used.

LED Display of the Gigabit Media Module

The LED displays of the module are the same as the LEDs of the basic device. With optical transmission, only a fixed transmission rate and full duplex mode are possible. The display in display modes B and C is analogous.

- In display mode A, the current connection status is displayed.
- In display mode B, the fixed transmission rate is displayed.
- In display mode C, the full duplex mode is always displayed.
- In display mode D, you can see whether or not the port is monitored.

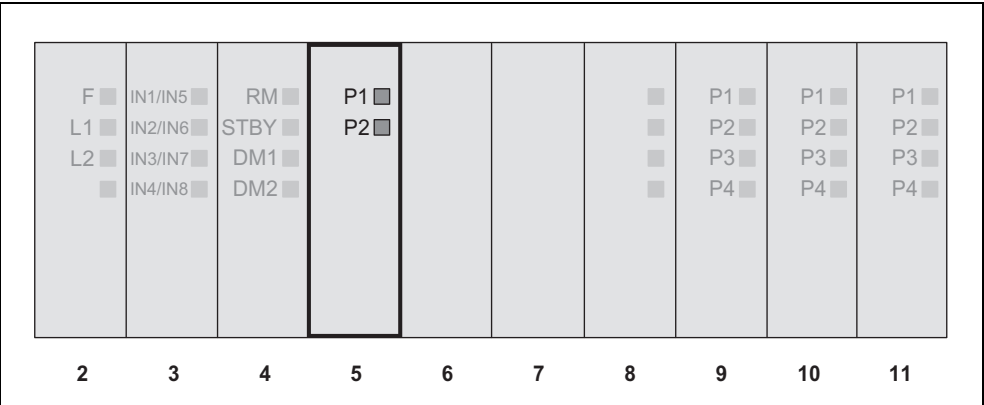


Figure 4-5 Slot of the MM492-2LD media module

4.2 Covers, Dummy Cover

4.2.1 Covers

Slots of the Covers

Note

The protective caps for the media module terminal strips and the covers must be fitted in all slots that do not contain media modules.

For slots for twisted pair (9 through 11), the covers are recommended to protect the RJ-45 jacks.

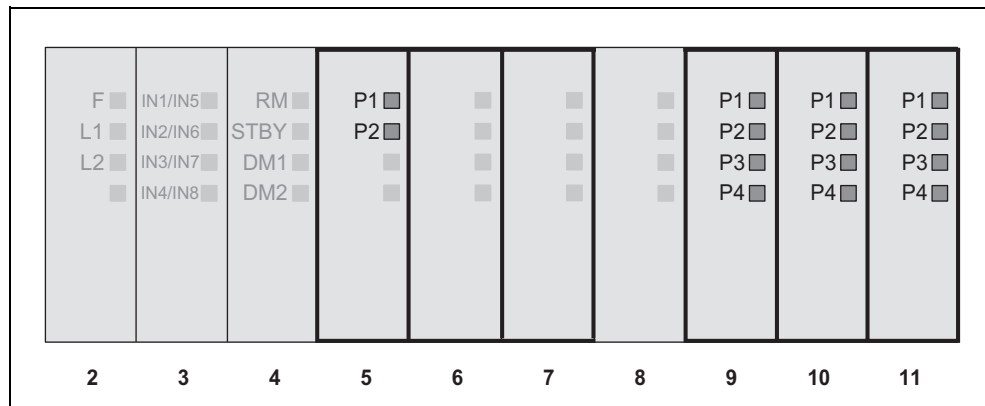


Figure 4-6 Possible slots of the covers

Available Cover Types

To cover slots not used for media modules or slots for twisted pair, the following types of cover are available:

- CV490 2x1000
- CV490 2x100
- CV490 4x100

CV490 2x1000

When using the gigabit ports for electrical cables (twisted pair), use cover type CV490 2x1000 on slot 5.

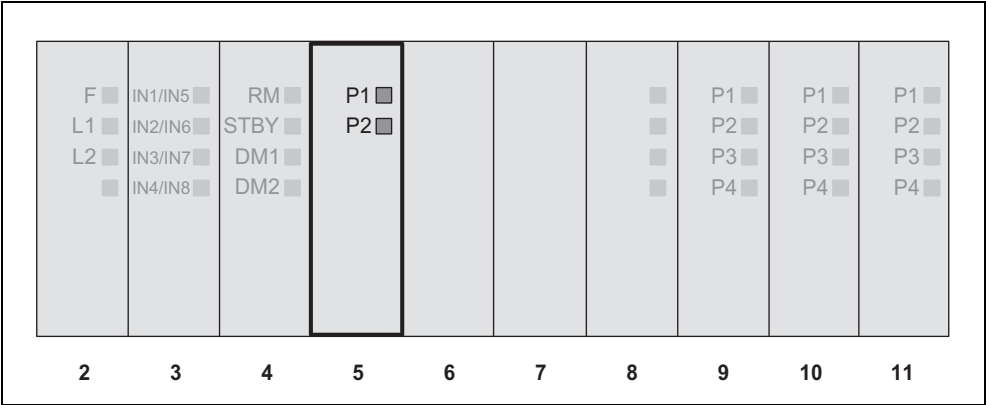


Figure 4-7 Slot 5 for cover CV490 2x1000

Displays of the Cover

The port status of the two electrical gigabit ports 1 and 2 are displayed on the front panel of the cover by two LEDs.

CV490 2x100

Slots 6 and 7 are solely for the fast Ethernet media modules MM491-2 and MM491-2LD. The basic device does not provide any ports on these slots.

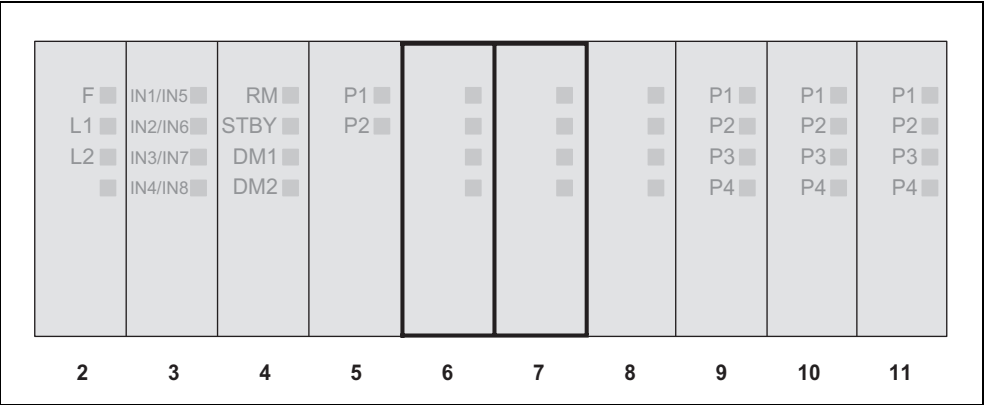


Figure 4-8 Slots 6 and 7 for cover CV490 2x100

Displays of the Cover

The LEDs of the CV490 2x100 cover have no function.

Further Slots for the CV490 2x100 Cover

Use the CV490 2x100 cover not only for the SCALANCE X414-3E but also for slots 12 through 15 of the media module extender EM496-4 if no media modules are inserted.

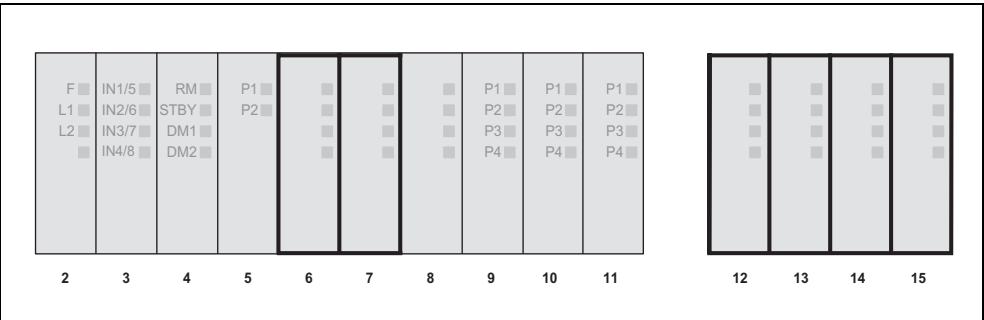


Figure 4-9 Slots 12 through 15 for cover CV490 2x100 on media module extender EM496-4

CV490 4x100

The SCALANCE X414-3E provides you with four electrical fast Ethernet ports on slots 9 through 11.

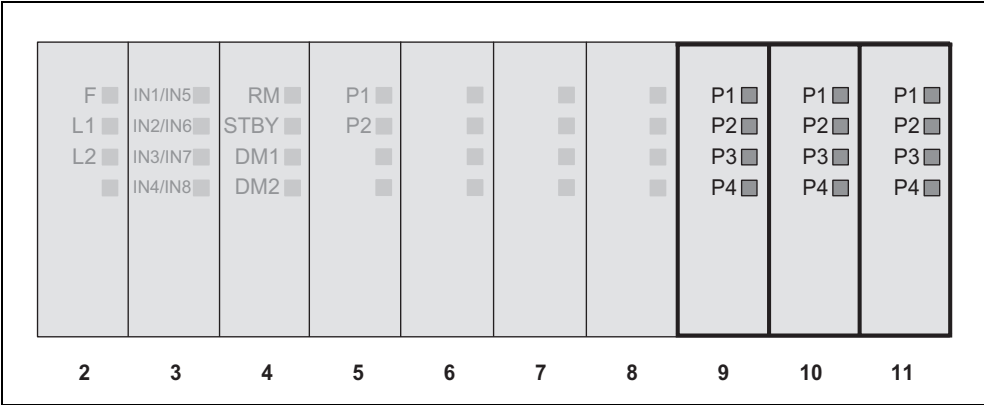


Figure 4-10 Slots 9 through 11 for cover CV490 4x100

Displays of the Cover

The status of each of the four fast Ethernet ports 1 through 4 is displayed on the front panel of the CV490 4x100 cover by four LEDs.

Further Slots for the CV490 4x100 Cover

The CV490 4x100 cover can not only be used with the SCALANCE X414-3E but also for slots 12 and 13 of the twisted pair extender EM495-8.

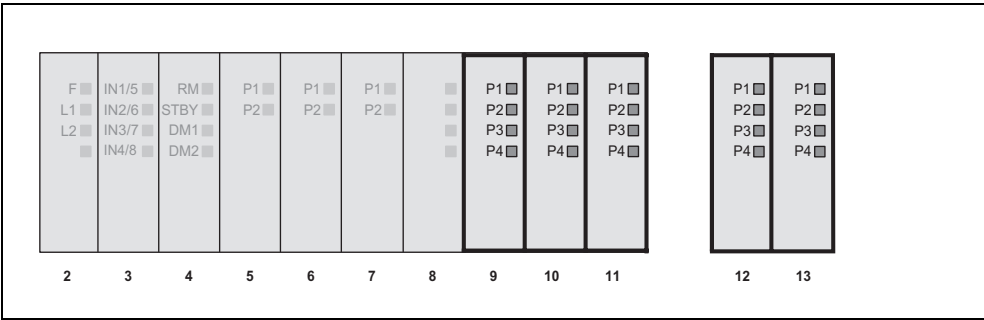


Figure 4-11 Slots 12 and 13 for the CV490 4x100 cover on the twisted pair extender module EM495-8

4.2.2 Dummy Cover

Slot of the Dummy Cover

The dummy cover with the name CV490 COVER is located in slot 8 of the SCALANCE X414-3E. Due to system requirements, this slot has no function.

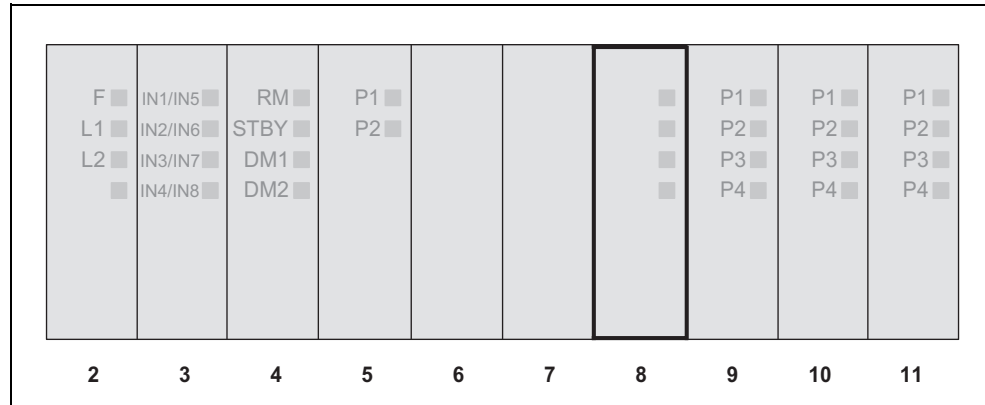


Figure 4-12 Slot 8 of the dummy cover

Displays of the Dummy Cover

The LEDs of the dummy cover have no function and there is therefore no port information on the front panel of the dummy cover.

Extender Modules

5

5.1 Twisted Pair Extender EM495-8

Eight Additional 100Base-TX Ports

The extender module for twisted pair transmission provides an additional eight ports for connecting twisted pair cables. The TP cable is attached to an 8-pin RJ-45 jack with securing collar.

Note
The twisted pair extenders can also be installed during operation.

The transmission rate of the Ethernet ports is 10 Mbps or as a fast Ethernet port 100 Mbps. No media module is required for data transfer with this extender module.

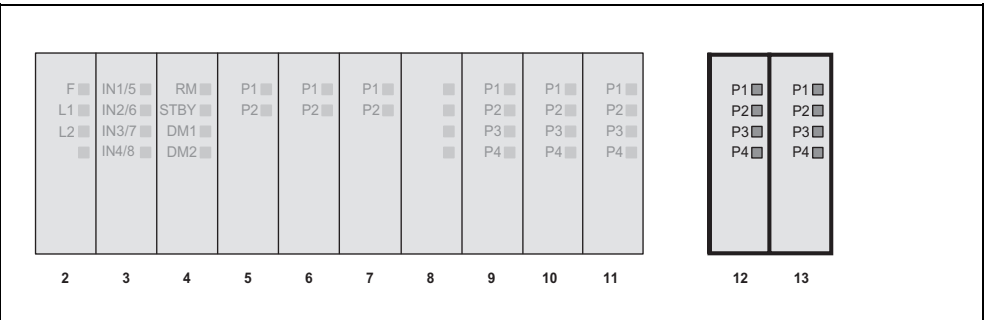


Figure 5-1 Basic device with twisted pair extender module

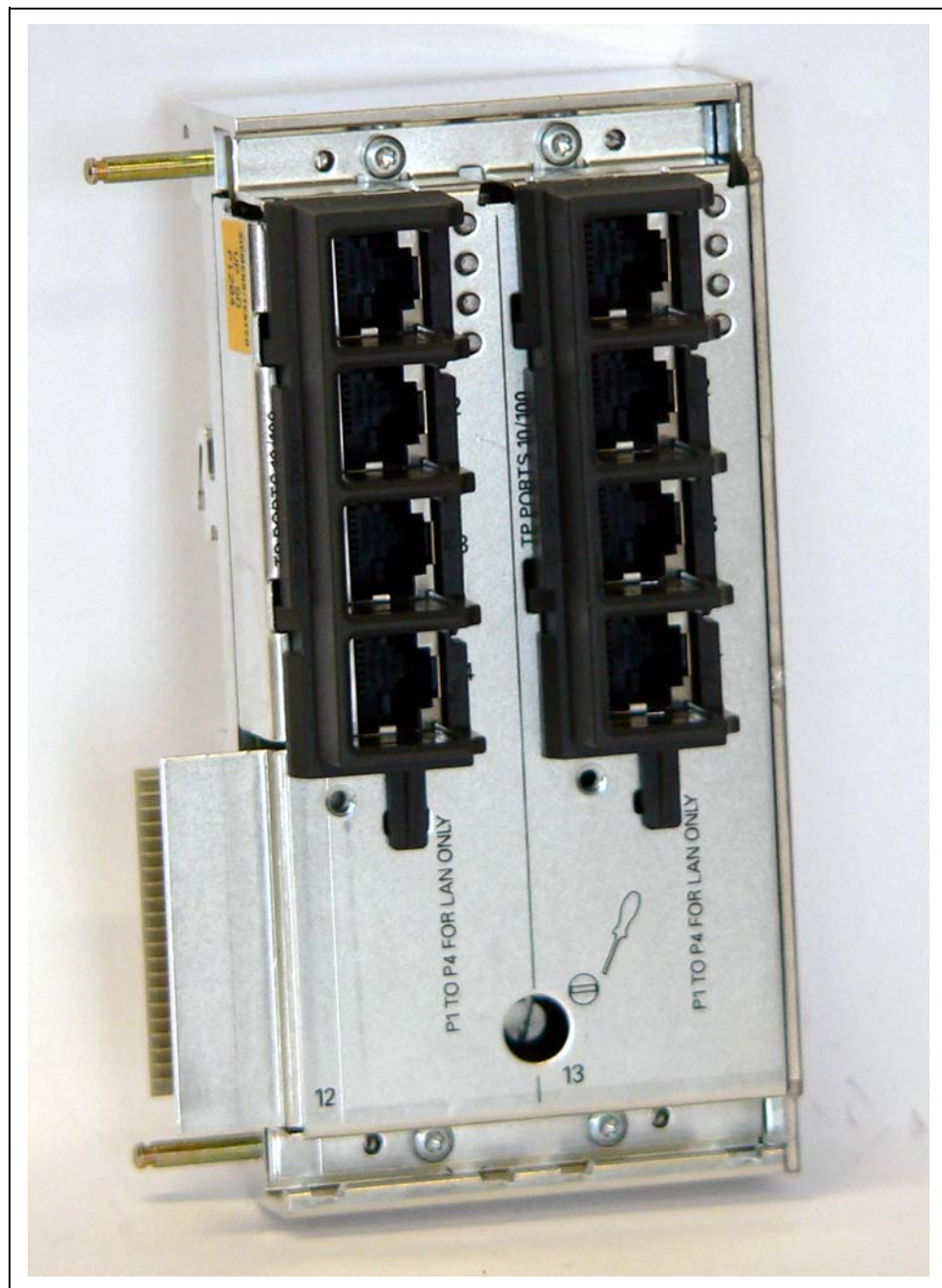


Figure 5-2 Twisted pair extender EM495-8

Covers

For slots 12 and 13 of the twisted pair extenders EM495-8, you can use the cover that can be used on slots 9 through 11 on the basic device. Two CV490 4x100 covers are supplied with the twisted pair extender.

5.2 Media Module Extender EM496-4

Four Additional Slots for Media Modules

By adding the media module extender, the basic device is extended by four slots that you can equip with the following modules as required:

- MM491-2
- MM491-2LD

If you use all slots, you have an additional eight optical fast Ethernet ports available (100 Mbps).

Note

Installation of the media module extender and removal or insertion of the media modules is possible during operation.

You require at least one media module for data transfer over this extender module.

Mixed operation in slots 12 through 15 with MM491-2 and MM491-2LD modules is possible. The media module plug connectors are protected by protective caps.

Connector

The connectors are 2x2 BFOC sockets.

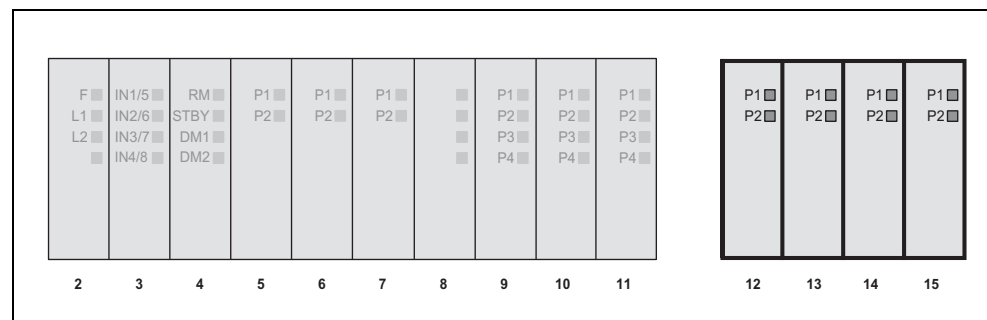


Figure 5-3 Basic device with media module extender



Figure 5-4 Empty media module extender EM496-4 without protective caps for the media module plug connectors and without cover

Covers

Four CV490 2x100 covers are supplied with the media module extender EM496-4. The media module plug connectors are also protected from damage by protective caps.



Figure 5-5 Media module extender EM496-4 with media module MM491-2 in slot 12 and with cover

Installation and Commissioning

6

6.1 Installing / Removing the SCALANCE X414-3E



Warning

SCALANCE X-400 is designed for operation with safety extra-low voltage (SELV). This means that only safety extra-low voltages (SELV) complying with IEC950/EN60950/ VDE0805 can be connected to the power supply terminals.

The power supply unit for the 24 V DC supply must comply with NEC Class 2 (voltage range 20.4 - 28.8 V DC, current requirement max. 2 A). If the device is supplied with power redundantly, both power supply units together must comply with NEC Class 2.

Exceptions:

- Power supply with PELV (according to VDE 0100-410) is also possible if the generated rated voltage does not exceed the voltage limits 25 V AC or 60 V DC.
 - Power supply by a SELV power source (according to IEC 60950) or PELV power source (according to VDE 0100-410) without limited power is also permitted if suitable fire protection measures are taken by:
 - Installation in a cabinet or suitable enclosure
 - Installation in a suitably equipped, closed room
-



Caution

The subject unit must be located in a Restricted Access Location where access can only be gained by SERVICE PERSONNEL or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken when operated in an air ambient of 50°C - 60°C

6.1.1 Installing / Uninstalling with an S7-300 Rail

Installing on an S7-300 Rail

For installation, you require a slotted screwdriver with a 5.5 mm wide blade.

Notice

When installing the SCALANCE X414-3E, hold it by the backplane and not by the modules, otherwise the device may be damaged.

To install the device, follow the steps below:

1. Tilt the basic device slightly towards the back with the upper groove on the edge of the S7-300 rail and push in towards the bottom. In this position, the basic device should not slip off but it can be adjusted horizontally to the left or right until the required position is achieved.
2. Remove the covers from slots 7 and 9 (see section 6.2.2) and the dummy cover from slot 8 (see section 6.2.3). If media modules are inserted, remove the fast Ethernet media module instead of the cover from slot 7 (see section 6.2.1).
3. Using a screwdriver with a 5.5 mm wide blade, tighten the two captive screws in the backplane at slot 7 and between slots 8 and 9 until the basic device can no longer be moved to the side.

Note

Only horizontal installation permitted (ventilation slit top/bottom).

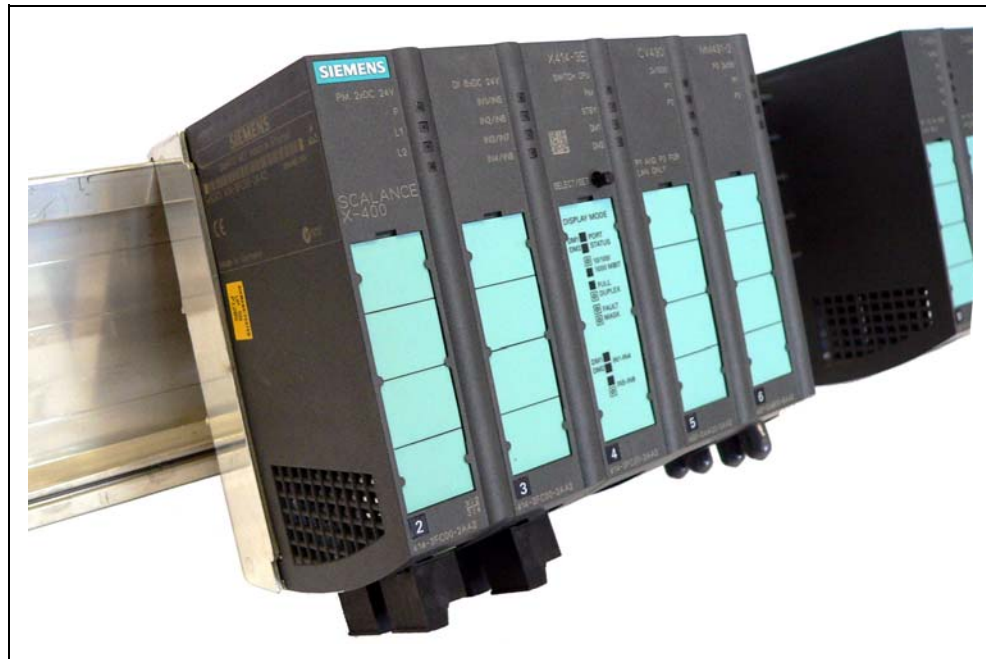


Figure 6-1 Installation on an S7-300 rail

Removing from the S7-300 rail

To remove the device, you require a slotted screwdriver with a 5.5 mm wide blade.

Notice

When removing the SCALANCE X414-3E, hold it by the backplane and not by the modules, otherwise the device may be damaged.

To remove the device, follow the steps below:

1. Remove the covers from slots 7 and 9 (see section 6.2.2) and the dummy cover from slot 8 (see section 6.2.3). If media modules are inserted, remove the fast Ethernet media module instead of the cover from slot 7 (see section 6.2.1).
2. Using a screwdriver with a 5.5 mm wide blade, loosen the two captive screws in the backplane at slot 7 and between slots 8 and 9.
3. Pull out the lower part of the basic device slightly towards the front and lift it from the S7-300 rail.

6.1.2 Installing / Uninstalling with a 35 mm Standard Rail

Installation on a 35 mm Standard Rail



Caution

If the SCALANCE X-400 is liable to severe vibration ($> 10\text{ g}$), use the S7-300 rail for installation. The 35 mm standard rail does not provide adequate support for the SCALANCE X-400 with vibration greater than 10 g .

Since the two captive screws in slot 7 and between slots 8 and 9 are not used to secure the device when installing on a 35 mm standard rail, it is not absolutely necessary to remove the covers and the blind cover, although this does make it easier to handle the basic device.

Notice

When installing the SCALANCE X414-3E, hold it by the backplane and not by the modules, otherwise the device may be damaged.

To install the device, follow the steps below:

1. Place the central groove containing two spring clips on the back of the basic device on the upper edge of the standard rail with the device tilted slightly towards the back. Make sure that the two spring clips are located behind the edge and are visible from the rear of the installation frame.
2. Press the basic device down and push in the lower part until you hear it click into place in the standard rail.
3. Adjust the basic device to the right or left until it is in the required position.

Note

Only horizontal installation permitted (ventilation slit top/bottom).



Figure 6-2 Installation on a 35 mm standard rail

Removing from the 35 mm Standard Rail

Since the two captive screws in slot 7 and between slots 8 and 9 are not used to secure the device, when removing it from a 35 mm standard rail, it is not absolutely necessary to remove the covers and the blind cover, although this does make it easier to handle the basic device.

Notice

When removing the SCALANCE X414-3E, hold it by the backplane and not by the modules, otherwise the device may be damaged.

To remove the device, follow the steps below:

1. Push the basic device down until the lower part can be pulled away from the standard rail to the front.
2. Lift the SCALANCE X414-3E up and off the standard rail.

6.2 Installing / Removing the Media Modules, Covers and Dummy Cover

6.2.1 Installing / Removing a Media Module

Installing a Media Module

For installation, you require a slotted screwdriver with a 2.8 mm wide blade.

Note

Installing a fast Ethernet media module is the same in the SCALANCE X414-3E and in the media module extender.

1. Remove the cover (see section 6.2.2) from the slot of the media module and remove the protective cap from the module terminal strip from the backplane of the basic device.

Note

Keep these parts in a safe place in case you want to remove the media module later.

2. Remove the inserted labeling strip from the front of the media module.
3. Place the two lower guides of the media module into the recesses at the lower edge of the basic device. It should no longer be possible to move the media module to the side.
4. Tilt the media module at an angle towards the back until the two plastic pins at the back top edge of the media module jut into the recesses in the basic device. The terminal strip of the media module must fit into the guide in the backplane.
5. Press the upper part of the media module onto the basic device until the fluted middle section of the media module is heard to click into place.
6. Tighten the captive screw on the front of the media module with a slotted screwdriver with a 2.8 mm wide blade.
7. Secure the labeling strip on the front of the media module.



Figure 6-3 Inserting a media module

Removing a Media Module

To remove the device, you require a slotted screwdriver with a 2.8 mm wide blade.

Note

Removing a fast Ethernet media module is the same in the SCALANCE X414-3E and in the media module extender.

1. Remove the inserted labeling strip from the front of the media module.
2. Release the captive screw on the front of the media module as far as it will go with a slotted screwdriver with a 2.8 mm wide blade.
3. Press on the fluted middle section of the top of the media module next to the backplane.
4. At the same time, tilt the media module down at an angle, the two guides initially remain in the recesses at the lower edge of the basic device.
5. Remove the media module by pulling it upwards.
6. Fit the protective cap on the module terminal strip on the backplane of the basic device. Fit the appropriate cover (see section 6.2.2) to the slot of the media module.

6.2.2 Fitting / Removing the Covers

Variants of the Covers

There are three variants of the covers

- **CV490 2x1000**
1 Gbps, electrical transmission, 2 port displays
possible slot: 5
- **CV490 2x100**
4 blind displays (no port displays connected to front)
possible slots: 6, 7 and extender module EM496-4 slots 12 through 15
- **CV490 4x100**
10/100 Mbps, electrical transmission, 4 port displays
possible slots: 9 through 11 and extender module EM495-8 slots 12, 13

Fitting a Cover

To fit a cover, you do not require any tools.

1. Place the two lower guides of the cover into the recesses at the lower edge of the basic device. It should no longer be possible to move the cover to the side.
2. Tilt the cover at an angle towards the back until the two plastic pins at the back top edge of the cover jut into the recesses in the basic device.
3. Press the upper part of the cover onto the basic device until the fluted middle section of the cover is heard to click into place.
4. Secure the labeling strip on the front of the cover.

Removing a Cover

To remove a cover, you do not require any tools.

1. Press on the fluted middle section of the top of the cover next to the backplane.
2. At the same time, tilt the cover down at an angle, the two guides initially remain in the recesses at the lower edge of the basic device.
3. Remove the cover by pulling it upwards.

6.2.3 Fitting / Removing a Dummy Cover

Fitting a Dummy Cover

There is only one dummy cover (no port displays connected to the front) on slot 8.

To fit a cover, you do not require any tools.

1. Place the two lower guides of the dummy cover into the recesses at the lower edge of the basic device. It should no longer be possible to move the dummy cover to the side.
2. Tilt the dummy cover at an angle towards the back until the two plastic pins at the back top edge of the dummy cover jut into the recesses in the basic device.
3. Press the upper part of the dummy cover onto the basic device until the fluted middle section of the dummy cover is heard to click into place.
4. Secure the labeling strip on the front of the dummy cover.

Removing a Dummy Cover

To remove a cover, you do not require any tools.

1. Press on the fluted middle section of the top of the dummy cover next to the backplane.
2. At the same time, tilt the dummy cover down at an angle, the two guides initially remain in the recesses at the lower edge of the basic device.
3. Remove the dummy cover by pulling it upwards.

6.3 Installing / Removing Extender Modules

6.3.1 Installing / Removing the Twisted Pair Extender

Installing the Twisted Pair Extender on the S7-300 Rail

You require the following tools:

- slotted screwdriver with a 2.8 mm wide blade
- slotted screwdriver with a 5.5 mm wide blade

Note

Make sure that in addition to the extender width of 87 mm, there is a clearance of 20 mm to the right of the basic device on the S7-300 rail to be able to align the guide bolts of the extender with the holes in the basic device during installation.

When installing a twisted pair extender on an S7-300 rail, the basic device remains in position. Follow the steps below:

1. Remove the cover from slot 11 of the basic device.
2. Remove the right-hand side panel of the basic device. To do this, use a slotted screwdriver with a 2.8 mm wide blade to loosen the two captive slug screws on slot 11 in the upper and lower recesses as far as they will go.
3. Remove the side panel of the basic device from the basic device to the right.

Note

Keep the panel in a safe place in case the extender needs to be removed again later.

4. Remove the two covers from the extender.
5. Place the extender module on the edge of the S7-300 rail with the upper groove angled slightly towards the back and tilt the extender towards the back. Make sure that there is adequate clearance between the guide bolts of the extender module and the basic device. In this position, the extender module should not be able to slip off, however it can be moved horizontally in both directions.

6. Push the extender module slowly to the left while keeping it straight and without skewing and check that the two guide bolts on the extender fit into the holes in the basic device. Then push the extender module to the left as far as it will go so that it is flush with the right side of the basic device.
7. Using a slotted screwdriver with a 5.5 mm wide blade, tighten the captive screw between slots 12 and 13 in the lower part of the extender module.
8. Using a slotted screwdriver with a 2.8 mm wide blade, tighten the two captive slug screws on slot 11. The screws lock the two guide bolts, so do not use excessive force when tightening them.
9. Fit the CV490 4x100 cover to slot 11 of the basic device and slots 12 and 13 of the twisted pair extender.



Figure 6-4 Installing the twisted pair extender on the S7-300 rail

Removing the Twisted Pair Extender from the S7-300 Rail

You require the following tools:

- slotted screwdriver with a 2.8 mm wide blade
- slotted screwdriver with a 5.5 mm wide blade

When removing a twisted pair extender from an S7-300 rail, the basic device remains in position. Follow the steps below:

1. To remove an extender module, remove the two covers on the extender.
2. Using a slotted screwdriver with a 5.5 mm wide blade, open the captive screw between slots 12 and 13 in the lower part of the extender module.
3. Remove the cover from slot 11 of the basic device.
4. Use a slotted screwdriver with a 2.8 mm wide blade to loosen the two captive slug screws on slot 11 of the basic device in the upper and lower recesses as far as they will go.
5. Push the extender module slowly to the right while keeping it straight until the two guide bolts of the extender module are completely outside the holes in the basic device.
6. Pull out the lower part of the extender module slightly towards the front and lift it from the S7-300 rail.
7. Replace the right side panel of the basic device so that the guide bolts fit into the two holes in the basic device.
8. Using a slotted screwdriver with a 2.8 mm wide blade, tighten the two captive slug screws on slot 11. The screws lock the two guide bolts, so do not use excessive force when tightening them.
9. Fit a suitable cover on slot 11 of the basic device.

Note

The basic device must not be used permanently without the right side panel.

Installing the Twisted Pair Extender on the 35 mm Standard Rail



Caution

If the SCALANCE X-400 with extender is liable to severe vibration ($> 10\text{ g}$), use the S7-300 rail for installation. The 35 mm standard rail does not provide adequate support for the twisted pair extender with vibration greater than 10 g.

For installation, you require a slotted screwdriver with a 2.8 mm wide blade.

Although the captive screw in the lower part between slots 12 and 13 of the extender module is not used when installing on a 35 mm standard rail, it is nevertheless advisable to remove the media modules.

Note

Make sure that in addition to the extender width of 87 mm, there is a clearance of 20 mm to the right of the basic device on the 35 mm standard rail to be able to align the guide bolts of the extender with the holes in the basic device during installation.

When installing a twisted pair extender on a 35 mm standard rail, the basic device remains in position. Follow the steps below:

1. Remove the cover from slot 11 of the basic device.
2. Remove the right-hand side panel of the basic device. To do this, use a slotted screwdriver with a 2.8 mm wide blade to loosen the two captive slug screws on slot 11 in the upper and lower recesses as far as they will go.
3. Remove the side panel of the basic device from the basic device to the right.

Note

Keep the panel in a safe place in case the extender needs to be removed again later.

4. Place the central groove containing a spring clip on the back of the extender module on the upper edge of the 35 mm standard rail with the module tilted slightly towards the back. Make sure that there is adequate clearance between the guide bolts of the extender module and the basic device.
5. The spring clip must be located behind the edge of the standard rail so that it is visible from the rear of the frame.

6. Press the extender module down and push in the lower part until you hear it click into place in the 35 mm standard rail.
7. Push the extender module slowly to the left while keeping it straight and without skewing and check that the two guide bolts on the extender fit into the holes in the basic device. Then push the extender module to the left as far as it will go so that it is flush with the right side of the basic device.
8. Using a slotted screwdriver with a 2.8 mm wide blade, tighten the two captive slug screws on slot 11. The screws lock the two guide bolts, so do not use excessive force when tightening them.
9. Fit the CV490 4x100 cover to slot 11 of the basic device and slots 12 and 13 of the twisted pair extender.



Figure 6-5 Installing the twisted pair extender on the 35 mm standard rail

Removing the Twisted Pair Extender from the 35 mm Standard Rail

To remove the device, you require a slotted screwdriver with a 2.8 mm wide blade.

The captive screw in the lower part of the extender module between slot 12 and 13 is not used for mounting on an 35 mm standard rail. When removing a twisted pair extender from a 35 mm standard rail, the basic device remains in position. Follow the steps below:

1. Remove the cover from slot 11 of the basic device.
2. Use a slotted screwdriver with a 2.8 mm wide blade to loosen the two captive slug screws on slot 11 of the basic device in the upper and lower recesses as far as they will go.
3. Push the extender module slowly to the right while keeping it straight until the two guide bolts of the extender module are completely outside the holes in the basic device.
4. Push the twisted pair extender down until the lower part can be pulled away from the standard rail to the front.
5. Lift the extender module up and off the 35 mm standard rail.
6. Replace the right side panel of the basic device so that the guide bolts fit into the two holes in the basic device.
7. Using a slotted screwdriver with a 2.8 mm wide blade, tighten the two captive slug screws on slot 11. The screws lock the two guide bolts, so do not use excessive force when tightening them.
8. Fit a suitable cover on slot 11 of the basic device.

Note

The basic device must not be used permanently without the right side panel.

6.3.2 Installing / Removing the Media Module Extender

Installing the Media Module Extender on the S7-300 Rail

You require the following tools:

- slotted screwdriver with a 2.8 mm wide blade
- slotted screwdriver with a 5.5 mm wide blade

Note

Make sure that in addition to the extender width of 155 mm, there is a clearance of 20 mm to the right of the basic device on the S7-300 rail to be able to align the guide bolts of the extender with the holes in the basic device during installation.

Note

Protective caps and CV490 2x100 covers must be fitted to all slots without media modules.

When installing a media module extender on an S7-300 rail, the basic device remains in position. Follow the steps below:

1. Remove the cover from slot 11 of the basic device.
2. Remove the right-hand side panel of the basic device. To do this, use a slotted screwdriver with a 2.8 mm wide blade to loosen the two captive slug screws on slot 11 in the upper and lower recesses as far as they will go.
3. Remove the side panel of the basic device from the basic device to the right.

Note

Keep the panel in a safe place in case the extender needs to be removed again later.

4. Remove the four covers from the extender.
5. Place the extender module on the edge of the S7-300 rail with the upper groove angled slightly towards the back and tilt the extender towards the back. Make sure that there is adequate clearance between the guide bolts of the extender module and the basic device. In this position, the extender module should not be able to slip off, however it can be moved horizontally in both directions.

6. Push the extender module slowly to the left while keeping it straight and without skewing and check that the two guide bolts on the extender fit into the holes in the basic device. Then push the extender module to the left as far as it will go so that it is flush with the right side of the basic device.
7. Using a slotted screwdriver with a 5.5 mm wide blade, tighten the captive screw between slots 13 and 14 in the lower part of the extender module.
8. Using a slotted screwdriver with a 2.8 mm wide blade, tighten the two captive slug screws on slot 11. The screws lock the two guide bolts, so do not use excessive force when tightening them.
9. Fit the CV490 4x100 cover on slot 11 of the basic device. Make sure that the media module terminal strips of slots not occupied by media modules have protective caps fitted and that the CV490 2x100 covers are in place.

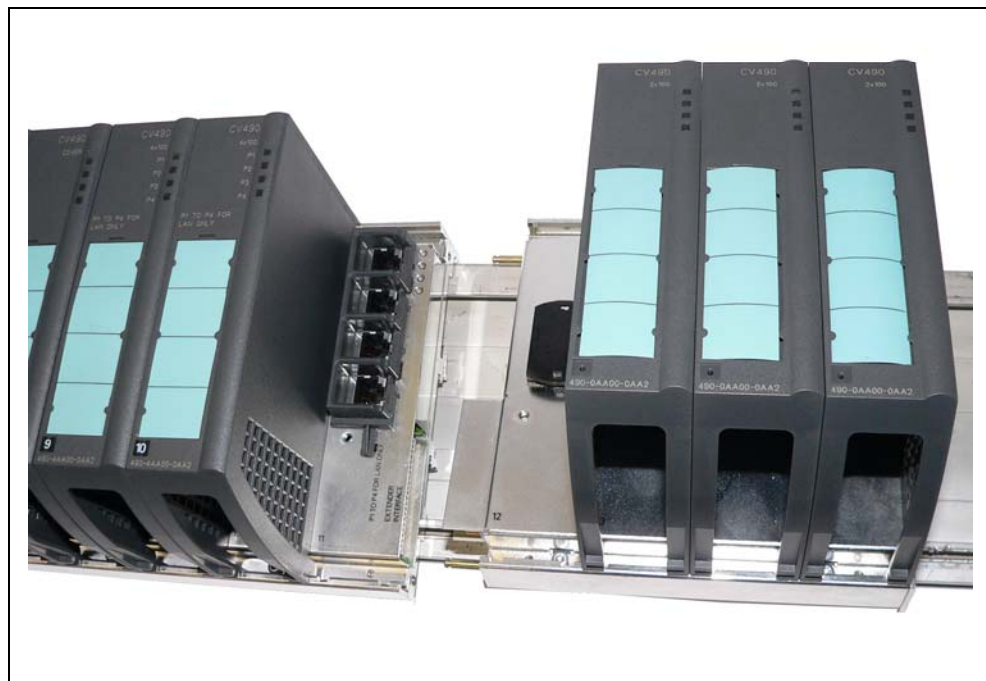


Figure 6-6 Installing the media module extender on the S7-300 rail

Removing the Media Module Extender from the S7-300 Standard Rail

You require the following tools:

- slotted screwdriver with a 2.8 mm wide blade
- slotted screwdriver with a 5.5 mm wide blade

Note

To remove the extender, remove the media modules from slots 13 and 14.

When removing a media module extender from an S7-300 rail, the basic device remains in position. Follow the steps below:

1. To remove an extender module, use a slotted screwdriver with a 5.5 mm wide blade, to open the captive screw between slots 13 and 14 in the lower part of the extender module.
2. Remove the cover from slot 11 of the basic device.
3. Use a slotted screwdriver with a 2.8 mm wide blade to loosen the two captive slug screws on slot 11 of the basic device in the upper and lower recesses as far as they will go.
4. Push the extender module slowly to the right while keeping it straight until the two guide bolts of the extender module are completely outside the holes in the basic device.
5. Pull out the lower part of the extender module slightly towards the front and lift it from the S7-300 rail.
6. Replace the right side panel of the basic device so that the guide bolts fit into the two holes in the basic device.
7. Using a slotted screwdriver with a 2.8 mm wide blade, tighten the two captive slug screws on slot 11. The screws lock the two guide bolts, so do not use excessive force when tightening them.
8. Fit a suitable cover on slot 11 of the basic device.

Note

The basic device must not be used permanently without the right side panel.

Installing the Media Module Extender on the 35 mm Standard Rail



Caution

If the SCALANCE X-400 with extender is liable to severe vibration ($> 10\text{ g}$), use the S7-300 rail for installation. The 35 mm standard rail does not provide adequate support for the media module extender with vibration greater than 10 g.

For installation, you require a slotted screwdriver with a 2.8 mm wide blade.

Although the captive screw in the lower part between slots 13 and 14 of the extender module is not used when installing on a 35 mm standard rail, it is nevertheless advisable to remove the media modules.

Note

Make sure that in addition to the extender width of 155 mm, there is a clearance of 20 mm to the right of the basic device on the 35 mm standard rail to be able to align the guide bolts of the extender with the holes in the basic device during installation.

Note

Protective caps and CV490 2x100 covers must be fitted to all slots without media modules.

When installing a media module extender on a 35 mm standard rail, the basic device remains in position. Follow the steps below:

1. Remove the cover from slot 11 of the basic device.
2. Remove the right-hand side panel of the basic device. To do this, use a slotted screwdriver with a 2.8 mm wide blade to loosen the two captive slug screws on slot 11 in the upper and lower recesses as far as they will go.
3. Remove the side panel of the basic device from the basic device to the right.

Note

Keep the panel in a safe place in case the extender needs to be removed again later.

4. Place the central groove containing a spring clip on the back of the extender module on the upper edge of the 35 mm standard rail with the module tilted slightly towards the back. Make sure that there is adequate clearance between the guide bolts of the extender module and the basic device.

5. The spring clip must be located behind the edge of the 35 mm standard rail so that it is visible from the rear of the frame.
6. Press the extender module down and push in the lower part until you hear it click into place in the standard rail.
7. Push the extender module slowly to the left while keeping it straight and without skewing and check that the two guide bolts on the extender fit into the holes in the basic device. Then push the extender module to the left as far as it will go so that it is flush with the right side of the basic device.
8. Using a slotted screwdriver with a 2.8 mm wide blade, tighten the two captive slug screws on slot 11. The screws lock the two guide bolts, so do not use excessive force when tightening them.
9. Fit the CV490 4x100 cover on slot 11 of the basic device. Make sure that the media module terminal strips of slots not occupied by media modules have protective caps fitted and that the CV490 2x100 covers are in place.

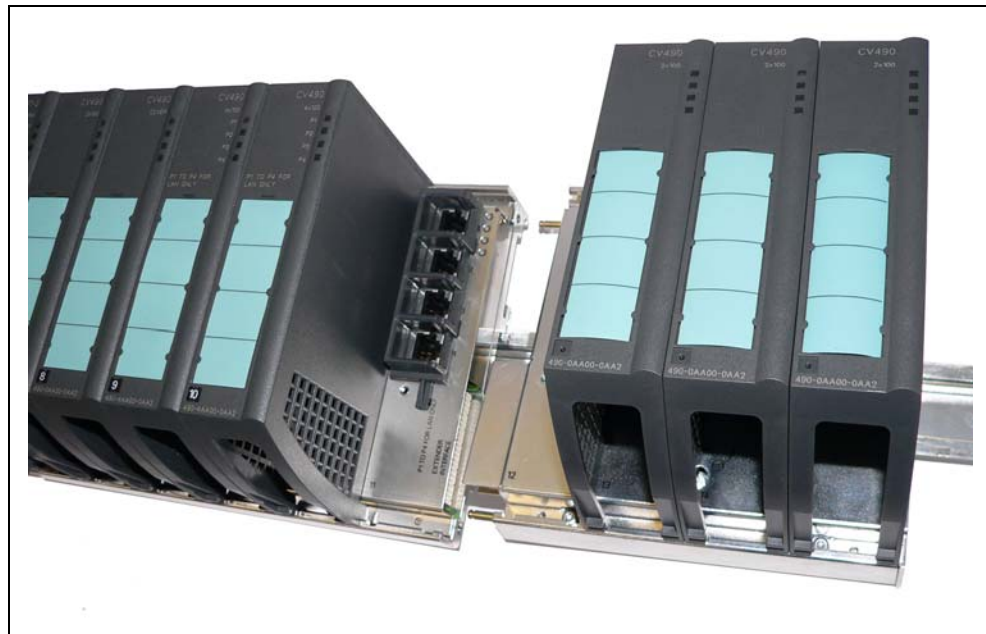


Figure 6-7 Installing the media module extender on the 35 mm standard rail

Removing the Media Module Extender from the 35 mm Standard Rail

To remove the device, you require a slotted screwdriver with a 2.8 mm wide blade.

Although the captive screw in the lower part between slots 13 and 14 of the extender module is not used on a 35 mm standard rail, it is nevertheless advisable to remove the media modules. When removing a media module extender from a 35 mm standard rail, the basic device remains in position. Follow the steps below:

1. Remove the cover from slot 11 of the basic device.
2. Use a slotted screwdriver with a 2.8 mm wide blade to loosen the two captive slug screws on slot 11 of the basic device in the upper and lower recesses as far as they will go.
3. Push the extender module slowly to the right while keeping it straight until the two guide bolts of the extender module are completely outside the holes in the basic device.
4. Push the media module extender down until the lower part can be pulled away from the standard rail to the front.
5. Lift the extender module up and off the 35 mm standard rail.
6. Replace the right side panel of the basic device so that the guide bolts fit into the two holes in the basic device.
7. Using a slotted screwdriver with a 2.8 mm wide blade, tighten the two captive slug screws on slot 11. The screws lock the two guide bolts, so do not use excessive force when tightening them.
8. Fit a suitable cover on slot 11 of the basic device.

Note

The basic device must not be used permanently without the right side panel.

6.4 Slot Numbers of the Modules and Covers

Specifying the Slot Number

The three preinstalled modules, the media modules, the covers for unused slots and the dummy cover for slot 8 must be labeled with the slot number using the slot number tabs supplied. Since the power supply unit is not located on the basic device and has slot number 1, start with number 2 for the power module. The order for the other modules is in ascending order to the right. The applies to any extender modules that may be used, starting from the left with number 12.

Applying the Slot Numbers

1. Place the required slot number in front of the module.
2. Place the tongue in the opening on the module.
3. Press the slot number into the recess on the front of the housing with your finger. The slot number breaks out of the wheel.

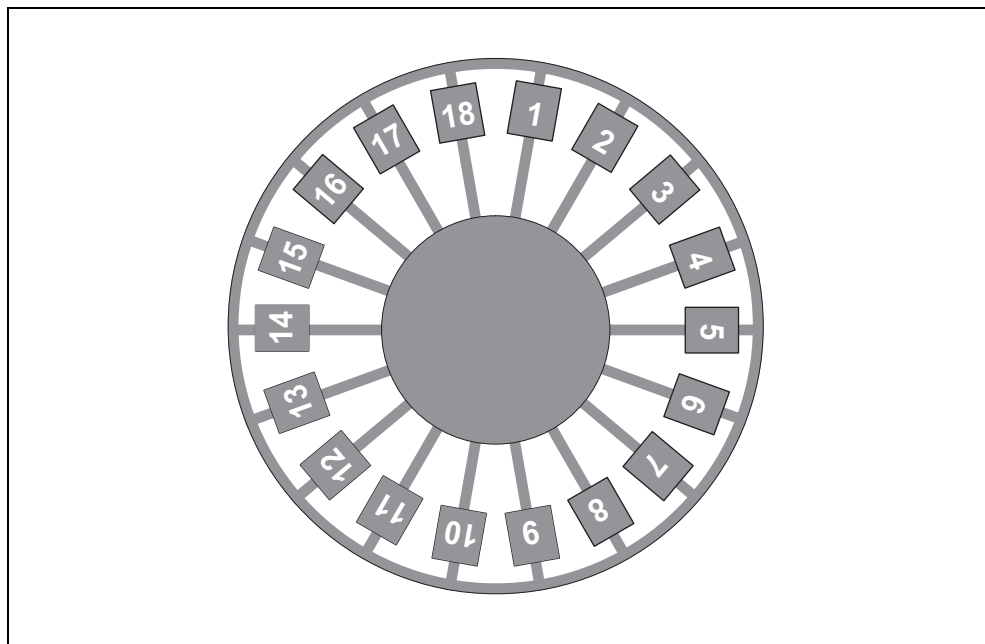


Figure 6-8 Slot number tabs

6.5 Factory Defaults

DIL Switches

When supplied, the four DIL switches on the switch are set to *OFF* as default.

Notice

Before starting up for the first time, check the switch settings.

- **RM**
is set to *OFF*. This means that the redundancy manager function is disabled.
- **STBY**
is set to *OFF*. This switch is intended for future applications and is does not currently have any function.
- **R1, R2**
are set to *OFF*. Both (electrical) gigabit ports on slot 5 are defined as ring ports.

Further Device Properties

With *R1* and *R2*, ring redundancy is enabled when the device ships.

Notice

In this mode, RSTP / STP cannot be activated.

C-PLUG

When delivered, the C-PLUG is empty and is initialized with the factory settings when first started up. All subsequent configuration changes are automatically adopted in the internal memory of the SCALANCE X414-3E and in the C-PLUG.

6.6 Ports

6.6.1 Power Supply Connectors (X1)

Polarity Reversal Protection X1, X2

The two 4-pin male connectors (X1, X2) for the power supply and the signaling contact have no polarity reversal protection. If the connectors are accidentally swapped over, this does not cause damage or destroy circuits. Normal functionality is, however, not available while the connectors are swapped over.

The redundant power supply is connected over a 4-pin connector at the front terminal block on the power module.

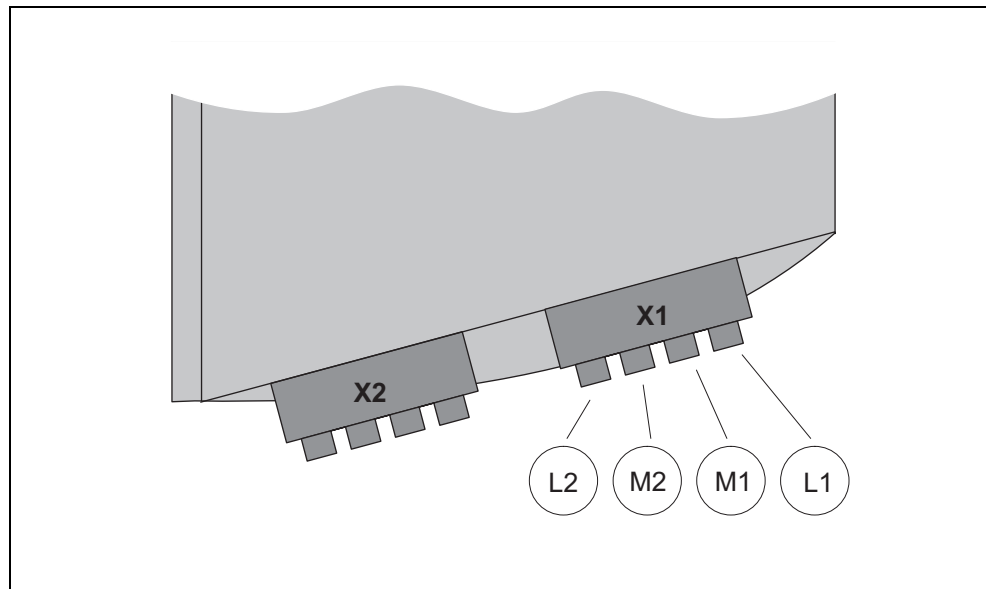


Figure 6-9 Pin assignment of connector X1

Conn. 1	L1+	+ 24 V power supply 1
	M1	Ground
	M2	Ground
	L2+	+ 24 V power supply 2

6.6.2 Connectors of the Signaling Contact and Grounding Strap (X2)

The signaling contact is connected by contacts MK1 and MK2 on the 4-pin connector to the rear terminal block on the PS module.

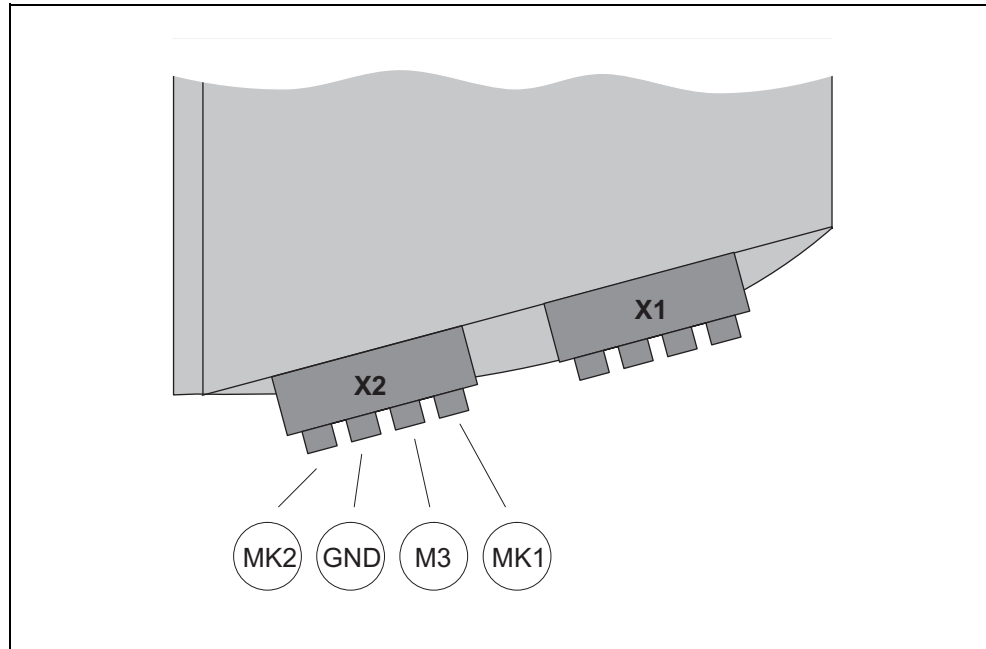


Figure 6-10 Pin assignment of connector X2

By inserting a strap between protective earth P and M3, the SCALANCE X414-3E switch can be operated with grounded reference potential.

When the device ships, no strap is fitted (non-grounded reference potential).

Conn. 2	MK1	Floating signaling contact relay connector 1
	M3	Ground
	GND	Protective earth
	MK2	Floating signaling contact relay connector 2

6.6.3 Digital Input Connectors (X1)

Polarity Reversal Protection X1, X2

The two 5-pin male connectors (X1, X2) of the digital inputs 1 through 8 have no polarity reversal protection. If the connectors are accidentally swapped over, this does not cause damage or destroy circuits. In display modes A and C or B and D, incorrect inputs are displayed during the time the connectors are swapped over.

Digital inputs 1 through 4 are connected using a 5-pin connector at the front terminal block on the DI module.

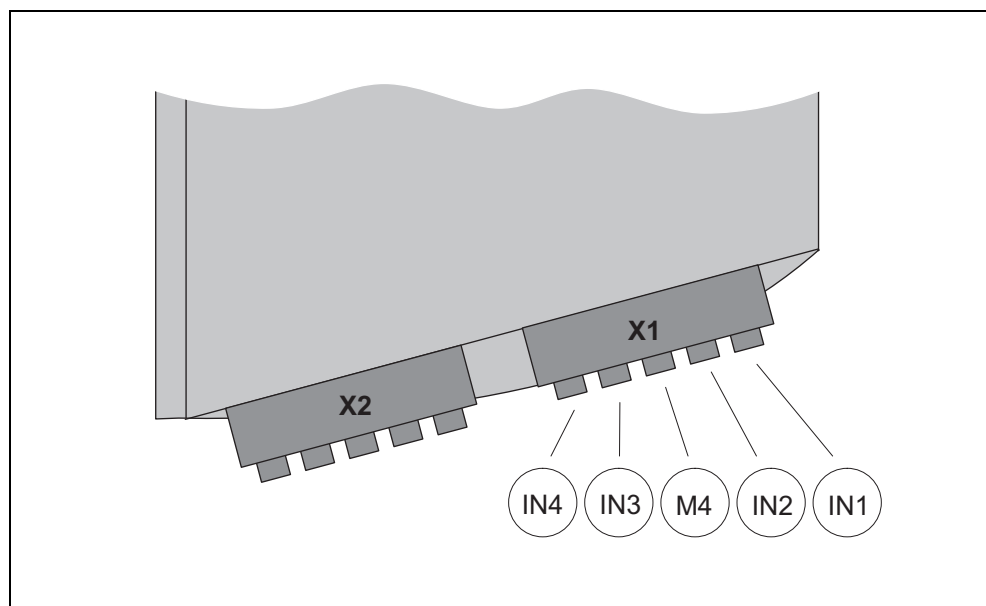


Figure 6-11 Pin assignment of connector X1 (Inputs 1 through 4)

Conn. 1	IN1	Digital input 1
	IN2	Digital input 2
	M4	Ground
	IN3	Digital input 3
	IN4	Digital input 4



Warning

The input voltage must not exceed + 30 V and must not fall below – 30 V, otherwise the DI module will be destroyed.

6.6.4 Digital Input Connectors (X2)

Digital inputs 5 through 8 are connected using a 5-pin connector at the rear terminal block on the DI module.

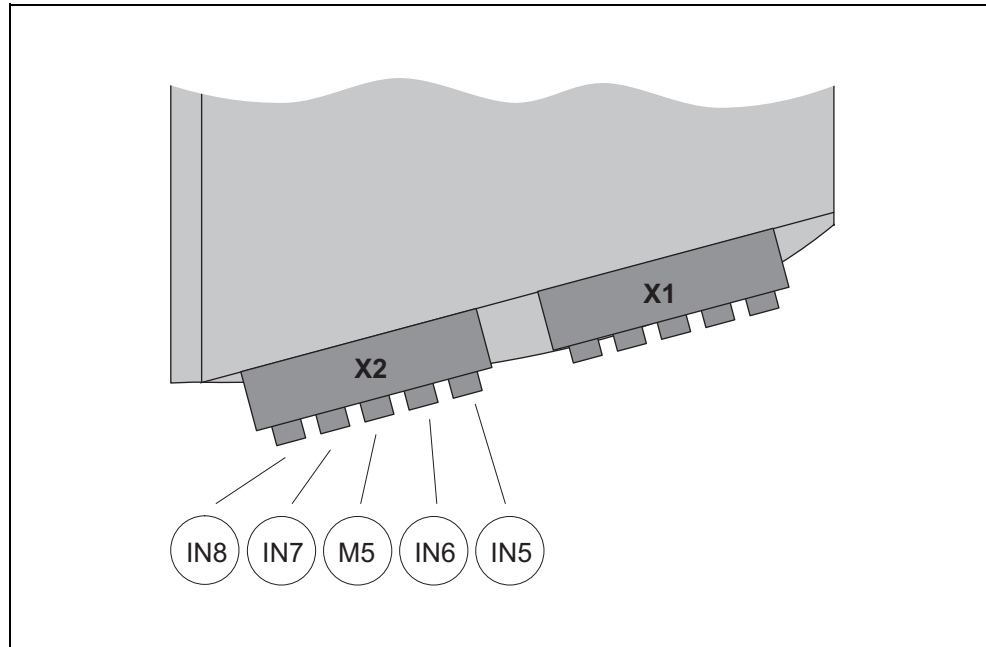


Figure 6-12 Pin assignment of connector X1 (Inputs 5 through 8)

Conn. 2	IN5	Digital input 5
	IN6	Digital input 6
	M5	Ground
	IN7	Digital input 7
	IN8	Digital input 8

6.6.5 Connectors for the Twisted Pair Cables

The FastConnect Cabling System

With the IE FC RJ-45 Plug and the FastConnect cables (FC), you can achieve a segment length up to 100 m without patching. In this case, the IE FC standard cable 2x2 is connected directly to the SCALANCE X414-3E and other components on the network.

Two FastConnect cable types are available, the eight-wire IE FC standard cable 4x2 and the four-wire IE FC standard cable 2x2.

The diameter of the IE FC standard cable 4x2 does not allow connection to an RJ-45 plug so that only the IE FC standard cable 2x2 as a four-wire cable is suitable for RJ-45 plugs. This means that the maximum transmission rate is 100 Mbps.

The flexible eight-wire patch cable (TP cord) for gigabit transmission allows a maximum cable length of 10 m.

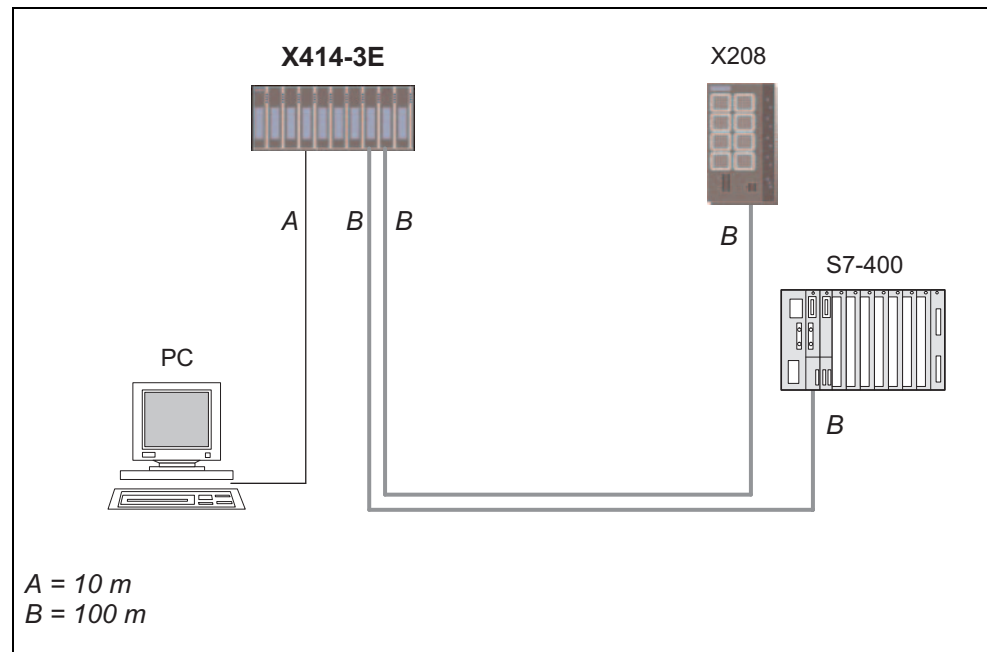


Figure 6-13 FastConnect Cabling
A TP cord (1 Gbps)
B IE FC Standard Cable 2x2 (100 Mbps)

Connecting TP Cord to FC Cable

To connect TP Cord to FC cables, two IE FC RJ-45 modular outlet insert types are available:

- IE FC RJ-45 modular outlet insert 1GE
1 R-J45 jack with 4x2 wire cable for 1 Gbps
- IE FC RJ-45 modular outlet insert 2FE
2 RJ-45 jacks each with 2x2 wire cable for 100 Mbps

With the IE FC RJ-45 modular outlet insert 1GE, the eight-wire FastConnect cable allows a transmission rate of 1 Gbps.

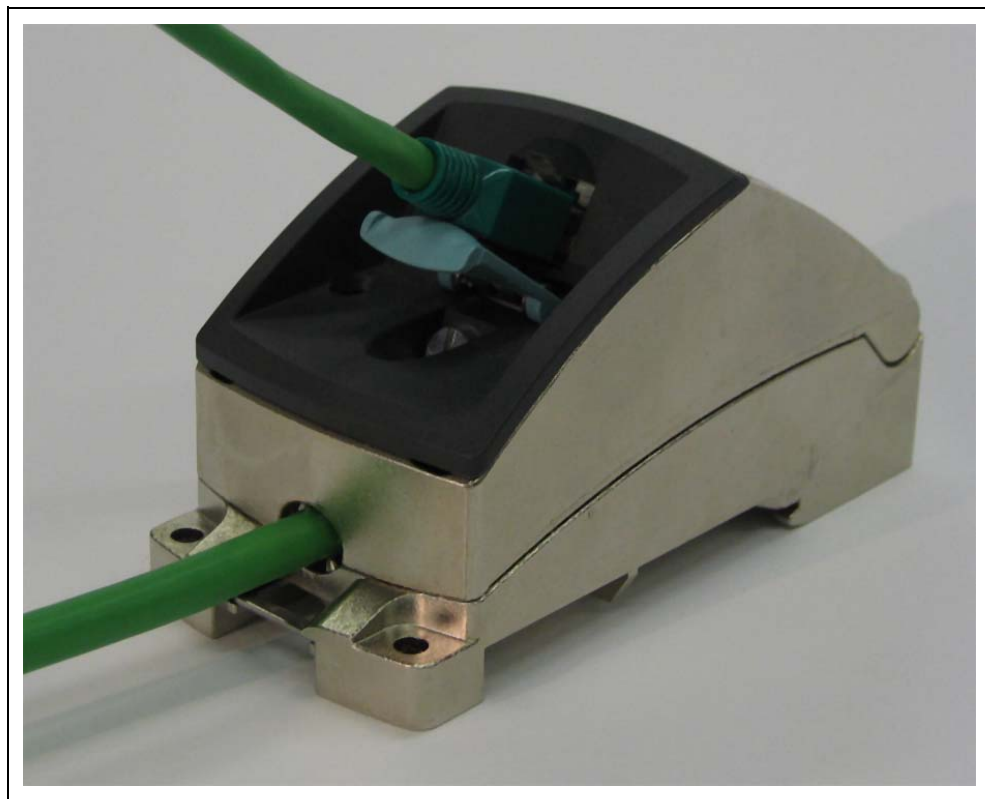


Figure 6-14 IE FC RJ-45 Modular Outlet Insert 1GE

With the IE FC RJ-45 modular outlet insert 2FE, the eight-wire FastConnect cable is split over two RJ-45 jacks and allows a transmission rate of 2 x 100 Mbps.

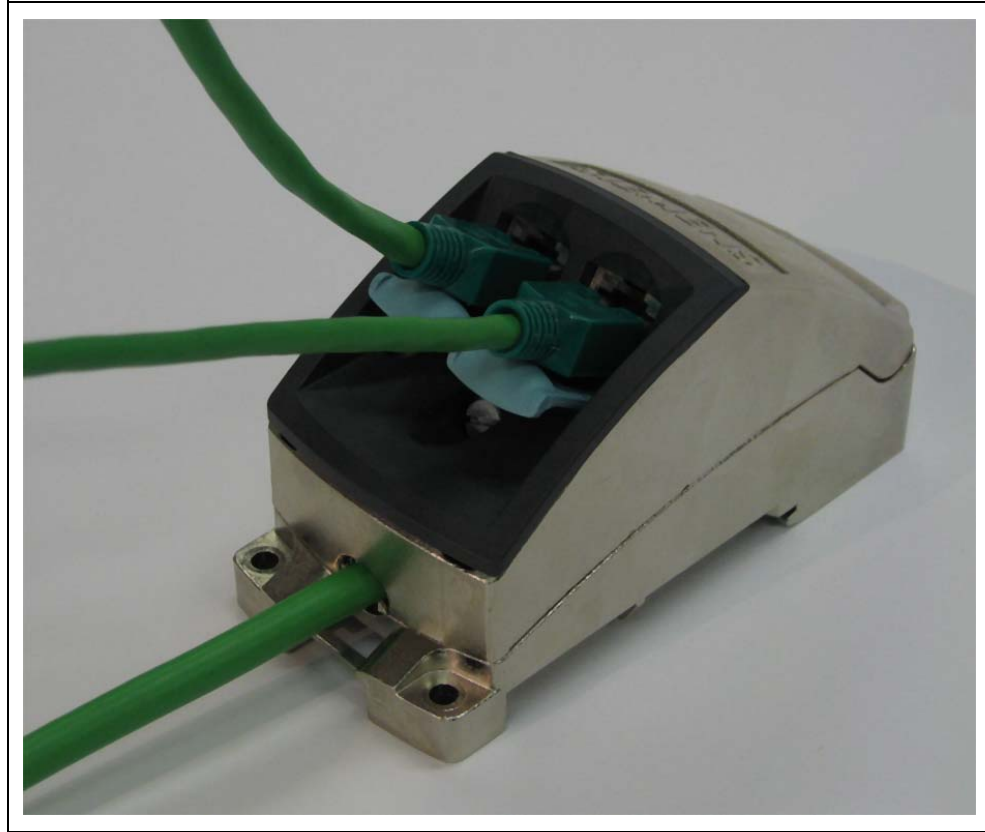


Figure 6-15 IE FC RJ-45 Modular Outlet Insert 2FE

The maximum segment length of 100 m also applies when using the FastConnect cabling with TP cord. Normally, FastConnect cable with a length of 90 m is used. The remaining 10 m is then available for TP cord at both ends (total of 10 m).

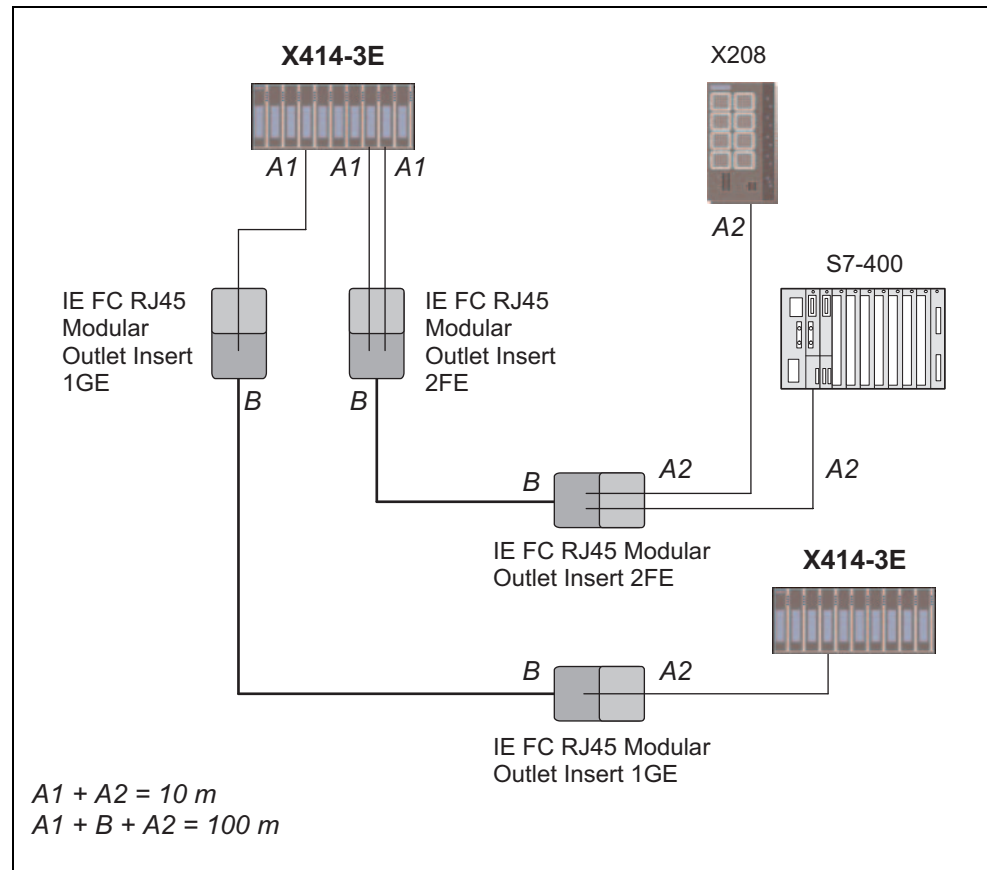


Figure 6-16 FastConnect Cabling
A1 TP Cord 4x2
A2 TP Cord 4x2
B IE FC Standard Cable 4x2

Removing the FC Cable from SCALANCE X414-3E

Under some circumstances, a screwdriver is necessary to remove the twisted pair cables with RJ-45 plugs because it may not be possible to reach the connector with your hand due to neighboring media modules, covers, or the dummy cover. If this is the situation, do the following:

1. Press the catch on the RJ-45 plug to the left with a small screwdriver.
2. Remove the cable.

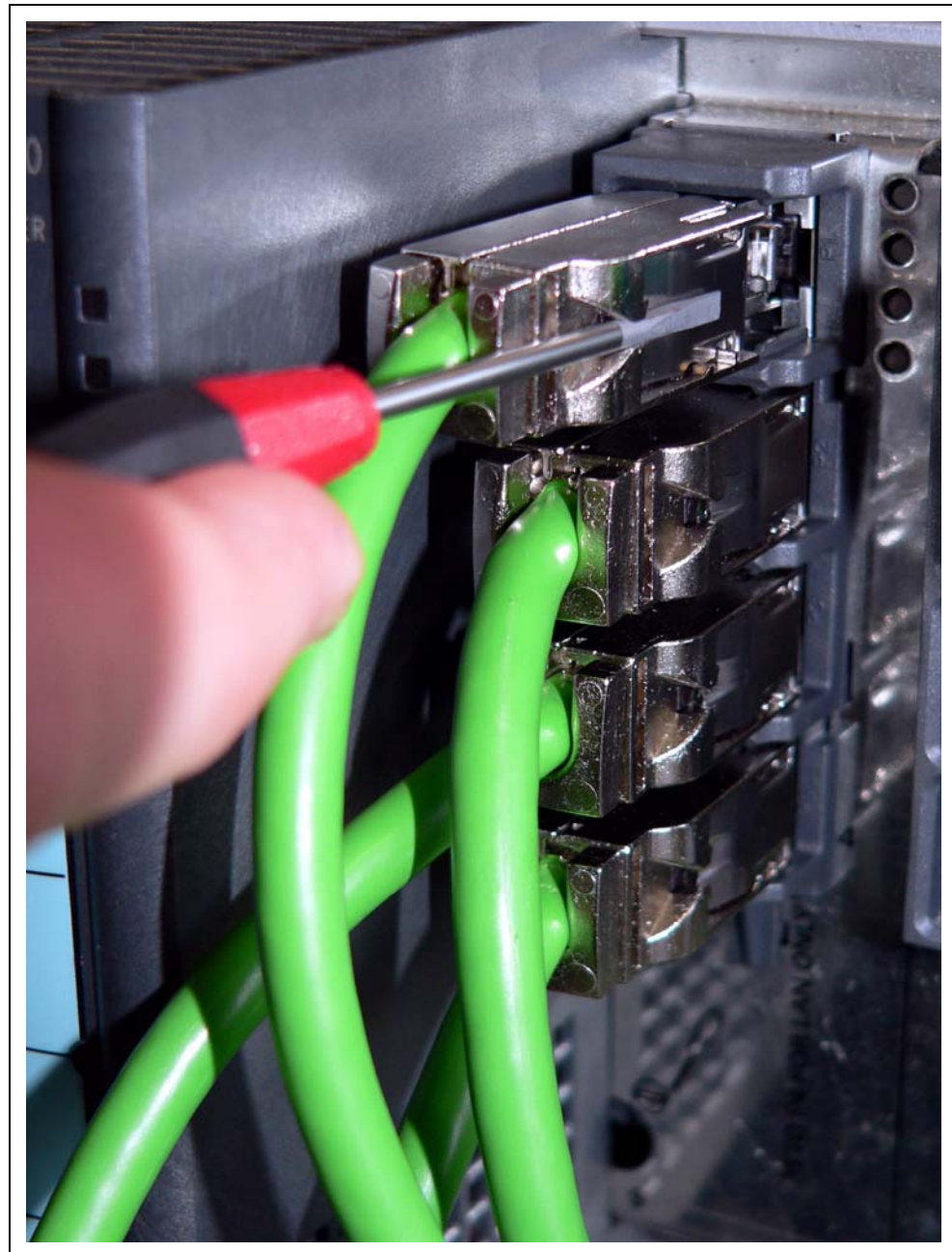


Figure 6-17 Releasing the FastConnect RJ-45 plug

6.6.6 Connectors for Fiber-Optic Cables

Gigabit Transmission with FOC

Data transmission at 1 Gbps is over multimode FOC or single mode FOC. In both cases, the fiber-optic cable is plugged into the SC duplex socket with the SC duplex plug. The connectors have polarity reversal protection mechanisms.

When a media module is inserted, port 1 is to the front and port 2 to the rear.

Notice

Fiber-optic cable connectors are susceptible to contamination and mechanical damage to the face. Protect open connections with the supplied dust caps.



Figure 6-18 SC Duplex plug with gigabit media module MM492-2LD

Fast Ethernet Transfer with FOC

Data transmission at 100 Mbps is over multimode FOC or single mode FOC. In both cases, the BFOC plug on the fiber-optic cable is plugged into the BFOC socket.

When a media module is inserted, the two front sockets belong to port 1 and the two rear sockets to port 2. The front socket is the input and the rear socket is the output socket of the particular port. Behind the labeling strip on the front of the media module, you will see the relevant symbols.

Notice

Fiber-optic cable connectors are susceptible to contamination and mechanical damage to the face. Protect open connections with the supplied dust caps.



Figure 6-19 BFOC plug with fast Ethernet media module MM491-2

6.7 Operator Controls

6.7.1 DIL Switches

Below the labeling strip on the Switch CPU, on slot 4, there are four DIL switches. These DIL switches can have one of two states (*ON* / *OFF*).



Figure 6-20 Power module, digital inputs and Switch CPU with controls

Notice

Changing the switch settings during operation causes fault displays and activates the signaling contact. The settings are adopted only after the device is restarted.

The RM switch allows you to configure the SCALANCE X414-3E as a redundancy manager in a ring with redundancy manager.

The STBY switch is reserved for future functionality and does not currently have any function.

With switches *R1* and *R2*, you can specify either the two ports in slot 5, the two ports in slot 6 or the first ports of slots 6 and 7 as ring ports. If you do not want any ring ports defined, both switches must be set to *ON*.

Switch	Status	Meaning
RM	OFF	SCALANCE X414-3E is not a redundancy manager.
	ON	SCALANCE X414-3E is a redundancy manager.
STBY	OFF	No function, reserved for future applications.
	ON	
R1	OFF	Ports in slot 5 (gigabit ports) are ring ports.
R2	OFF	
R1	ON	Ports 1 and 2 of slot 6 are ring ports.
R2	OFF	
R1	OFF	Port 1 of slot 6 is first ring port.
R2	ON	Port 1 of slot 7 is second ring port.
R1	ON	No ring redundancy.
R2	ON	

When shipped, the factory settings apply (see section 6.5).

Ring Ports in Slots 5 to 7

If *R1* and *R2* are set to *OFF*, the two gigabit ports of slot 5 are selected as ring ports.

Note
If the SCALANCE X414-3E is operated without media modules, *R1* and *R2* must be set to *OFF*, otherwise ports in slots 6 and 7 will be defined as ring ports that are only available when media modules are plugged in.

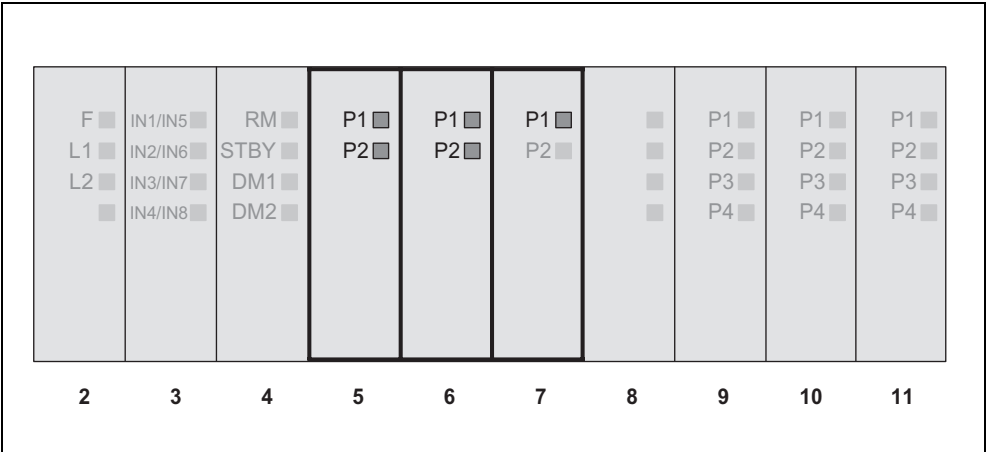


Figure 6-21 Ring ports that can be defined with switches R1 and R2

Possible Settings of the Ring Ports

Note

Only two ports of a switch can ever be defined as ring ports. All other ports in slots 6 and 7 that are not defined as ring ports can be used for the optical connection of nodes or subnets.

- **Switch 1:**
In the schematic below, switches *R1* and *R2* are set to *OFF*.
- **Switch 2:**
In the schematic below, switch *R1* is set to *ON* and *R2* is set to *OFF*.
- **Switch 3:**
In the schematic below, switch *R1* is set to *OFF* and *R2* is set to *ON*.

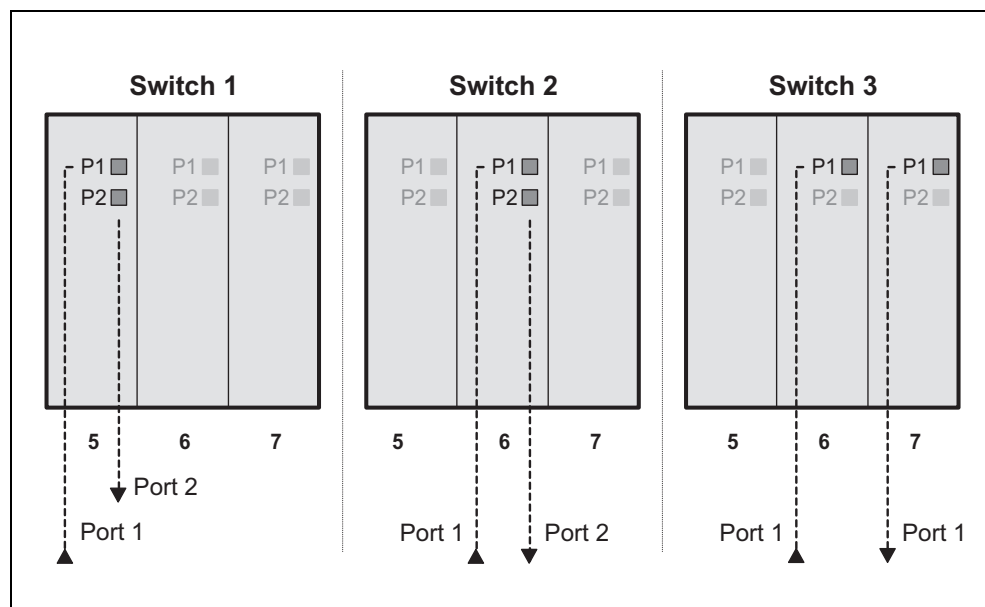


Figure 6-22 The three possible settings for ring ports with R1 and R2

6.7.2 SELECT / SET Button

The SELECT / SET button is used to switch over the display modes (DMode). After turning on the SCALANCE X414-3E, it is in DMode A.

The button has the following functions:

- **Changing the display modes**
By pressing the button briefly, you change from one display mode to the next. The selected mode or current status is displayed by the LEDs (DM1, DM2).
- **Resetting to the factory defaults**
It is possible to restore some of the factory default settings in DMode A by pressing the button for 12 seconds. You can cancel the reset procedure by releasing the button before the 12 seconds have elapsed. All previously made settings are overwritten by the factory defaults.
- **Defining the fault mask and the LED displays**
It is possible to set the fault mask in DMode A and DMode D. This allows you to specify the mask for signaling faults by defining an individual "good status" for the connected ports and the power supplies. In this case, you press the button for 5 seconds in DMode A or DMode D. After 3 seconds, the two LEDs (DM1 and DM2) start to flash. You can cancel the procedure by releasing the button before the 5 seconds have elapsed. If, however, you press the button for a further 2 seconds, the current states of all ports and the states of the power supplies L1 and L2 are included in the fault mask. The previous fault mask is then overwritten.

6.8 LED Display

Overview

The following table shows the states indicated by the LEDs in the various display modes. For more detailed information, refer to the subsections listed in the first column.

	LED	Display Mode A	Display Mode B	Display Mode C	Display Mode D
Power Module (See 6.8.3)	F	Problem, signaling contact opens			
	L1	Power supply L1 is applied.			Power supply L1 is monitored
	L2	Power supply L2 is applied.			Power supply L2 is monitored
DI Module (See 6.8.4)	IN1/IN5	Signal at input IN1	Signal at input IN5	Signal at input IN1	Signal at input IN5
	IN2/IN6	Signal at input IN2	Signal at input IN6	Signal at input IN2	Signal at input IN6
	IN3/IN7	Signal at input IN3	Signal at input IN7	Signal at input IN3	Signal at input IN7
	IN4/IN8	Signal at input IN4	Signal at input IN8	Signal at input IN4	Signal at input IN8
Switch CPU (See 6.8.5)	RM	Device is operating as RM			
	STBY	Reserved (no function)			
	DM1	off	on	off	on
	DM2	off	off	on	on
Ports (See 6.8.6)	P1	Port status	Transmission rate	Half / full duplex	Fault mask
	P2				
	P3				
	P4				

6.8.1 Startup Behavior of the SCALANCE X414-3E

During device startup, the red LED on the power module signals the current status of the device. For more detailed information, refer to the following table:

	LED on	LED off	LED flashes
During device startup	Device starting up or fault occurred	Device startup completed without problems	Keyboard entry over serial interface or bad firmware image
During operation	Fault occurred	Problem-free operation	

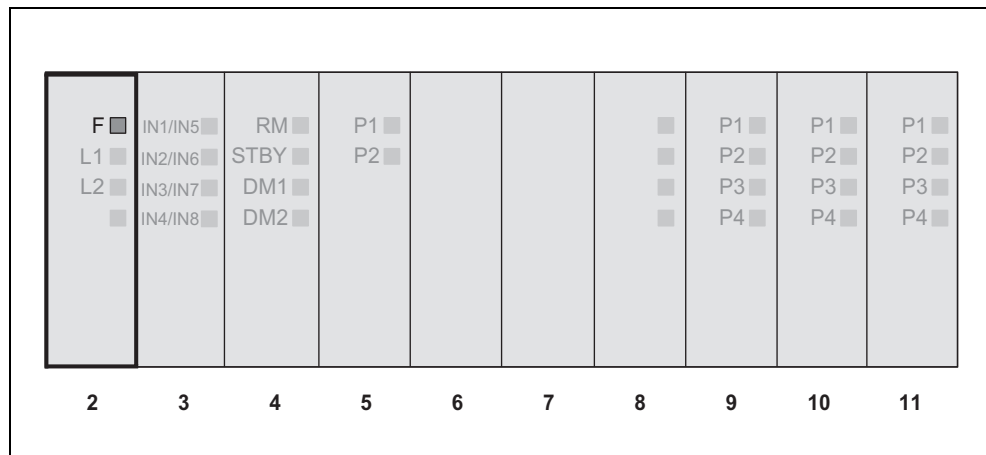


Figure 6-23 Fault LED on the power module

6.8.2 Selecting the Display Modes

Press the SELECT / SET button on the Switch CPU until the DM1 and DM2 light up on the CPU in the required combination. The selected display mode is then activated.

There is an automatic switchover to DMode A if the button is not pressed for longer than one minute.

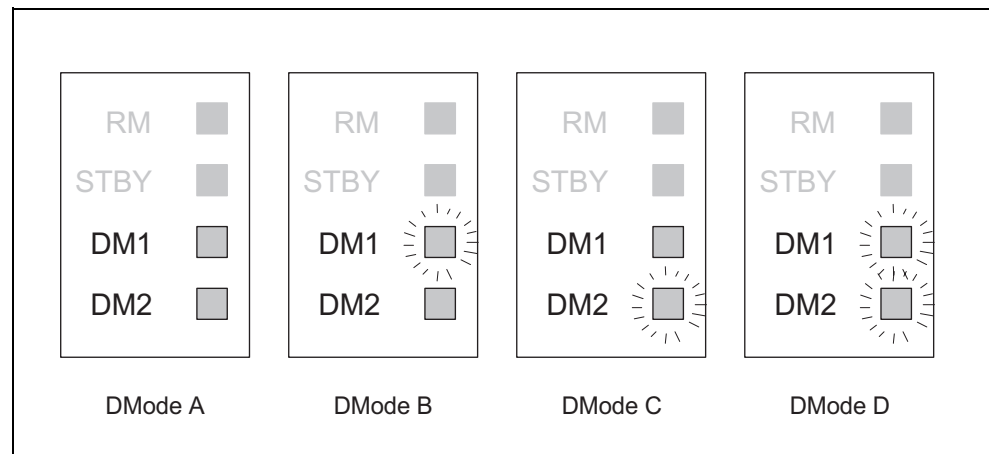


Figure 6-24 Display of the four possible display modes

6.8.3 LED Display - Power Module

Display Modes A through C

In display modes A through C, the two LEDs DM1 and DM2 of the Switch CPU are lit as described in section 6.8.2. In these three states, the status of the signaling contact and the presence of the supply voltages are displayed by the LEDs of the power module.

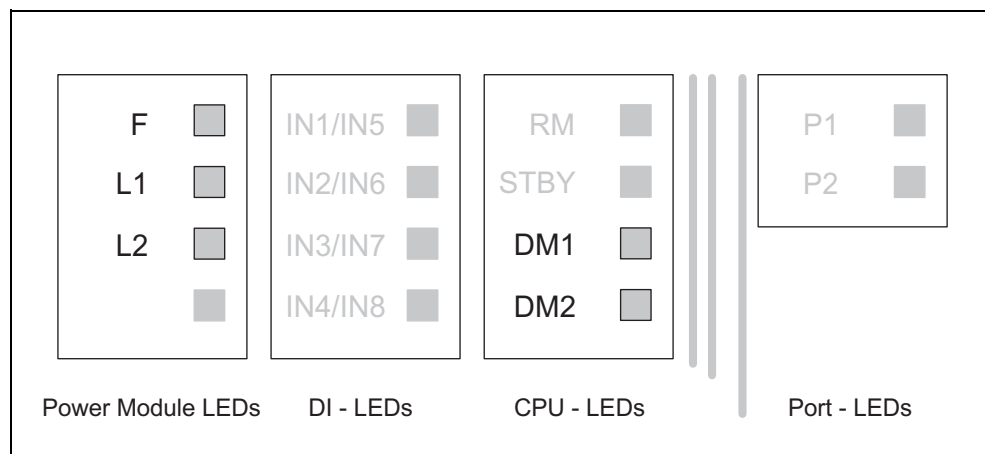


Figure 6-25 Example of the LED display of the power module and the Switch CPU in DMode A

The following table lists the significance of the three LEDs on the power module for display modes A through C:

Label	Color	Status	Meaning
F		off	The SCALANCE X414-3E has not detected any faults, the signaling contact is closed.
	Red	on	The SCALANCE X414-3E has detected a fault, the signaling contact opens.
L1		off	Power supply L1 lower than 17 V.
	Green	on	Power supply L1 higher than 17 V.
L2		off	Power supply L2 lower than 17 V.
	Green	on	Power supply L2 higher than 17 V.

Display in Display Mode D

In display mode D, both the DM1 and DM2 LEDs of the Switch CPU are on. This mode indicates whether the power supply is being monitored with the signaling contact.

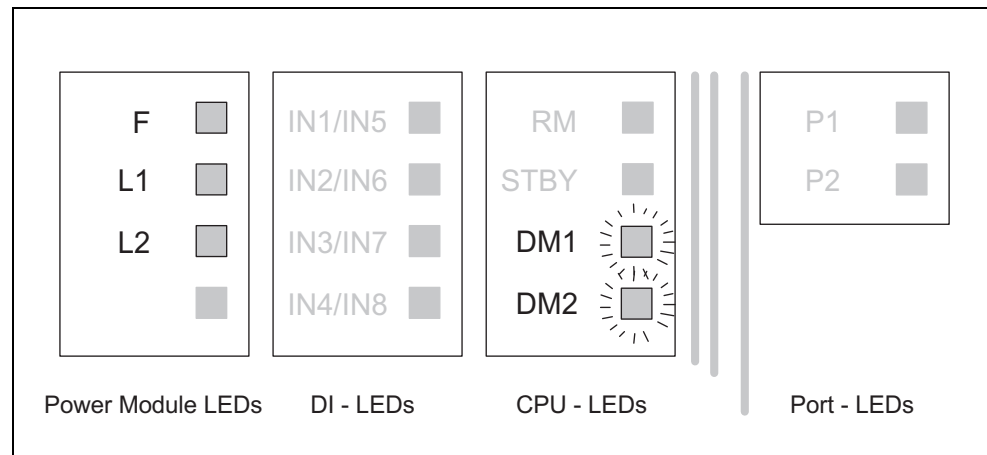


Figure 6-26 LED display of the power module and the Switch CPU in DMode D

The following table shows the meaning of the three light emitting diodes on the power module in display mode D:

Label	Color	Status	Meaning
F		off	No problem has been detected by the SCALANCE X414-3E.
	Red	on	The SCALANCE X414-3E has detected a problem. The signaling contact opens.
L1		off	Power supply L1 is not monitored. If L1 falls below 17 V, the signaling contact does not respond.
	Green	on	Power supply L1 is monitored. If L1 falls below 17 V, the signaling contact responds.
L2		off	Power supply L2 is not monitored. If L2 falls below 17 V, the signaling contact does not respond.
	Green	on	Power supply L2 is monitored. If L2 falls below 17 V, the signaling contact responds.

6.8.4 LED Display - DI Module

LED Display of the Digital Inputs 1 through 8

The status of four digital inputs (IN1 through IN4 or IN5 through IN8) can be indicated by the four LEDs on the front panel of the DI module.

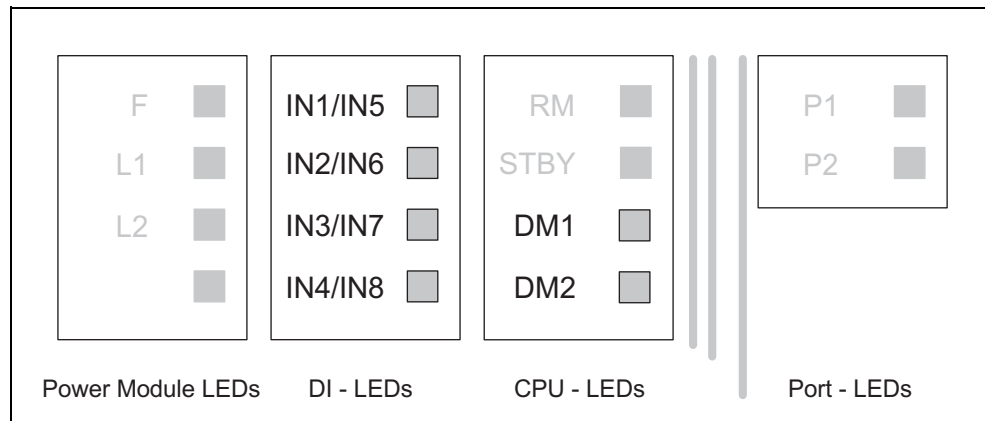


Figure 6-27 LEDs of the digital inputs and display modes

Four modes (display mode A through D) are available and these are displayed by two LEDs (DM1, DM2) on the Switch CPU. The display modes A and C are identical as are modes B and D.

Mode	DM1	DM2	IN1/5	IN2/6	IN3/7	IN4/8	Meaning
DMode A DMode C	off	off					Digital inputs IN1 through IN4
			on				Signal at input IN1
				on			Signal at input IN2
					on		Signal at input IN3
						on	Signal at input IN4

Mode	DM1	DM2	IN1/5	IN2/6	IN3/7	IN4/8	Meaning
DMode B DMode D	on	off					Digital inputs IN5 through IN8
			on				Signal at input IN5
				on			Signal at input IN6
					on		Signal at input IN7
						on	Signal at input IN8

6.8.5 LED Display - Switch CPU

Display Modes A through D

The set display modes are indicated as follows:

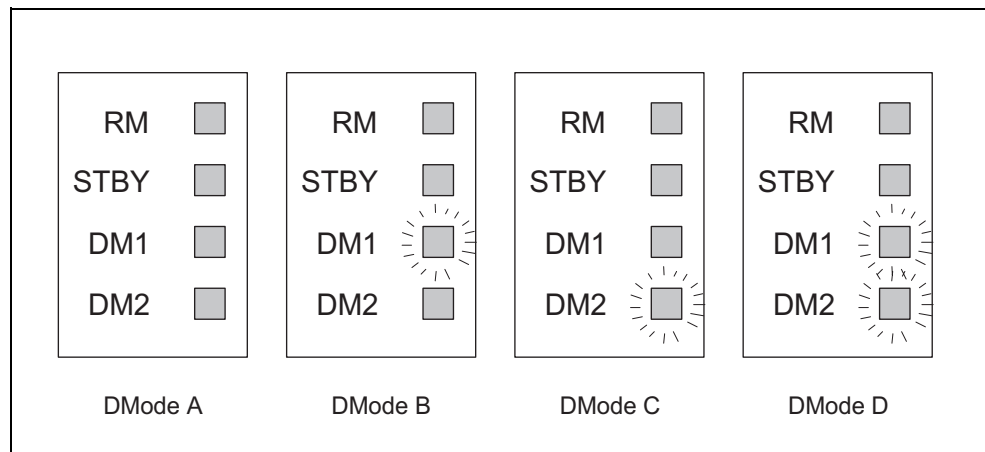


Figure 6-28 Display of the possible display modes (DMode A through DMode D)

The individual functions (RM, STBY and DM1 / DM2) are independent of each other. The LED displays are described below:

Label	Color	Status	Meaning
RM	Green	off	The SCALANCE X414-3E is not operating in redundancy manager mode.
		on	The SCALANCE X414-3E is operating in redundancy manager mode. The ring is working without problems, monitoring is activated.
		flashes	The SCALANCE X414-3E is operating in redundancy manager mode. An interruption has been detected on the ring; the SCALANCE X414-3E has switched through.
STBY		off	No function, reserved for future applications.
DM1	Green	on	Display of the display mode.
DM2	Green	on	Display of the display mode.

6.8.6 LED Display of the Ports (DMode A through DMode D)

The two LEDs of slot 5 or the four LEDs of slots 9 through 11 of the basic device indicate various port statuses depending on the set display modes. The displays have the same significance for all ports on all slots of the basic device and the extender modules EM495-8 and EM496-4.

Port Statuses in DMode A

In display mode A, the current port status is displayed.

Port	Color	Status	Meaning
P1 P2 P3 P4		off	No valid link to the port (for example station turned off or cable not connected)
	Green	on	Link exists.
		flashes three times per period	Port turned off by management.
		flashes four times per period	Port is monitored port.
	Yellow	flashes / lit	Receiving data at port.

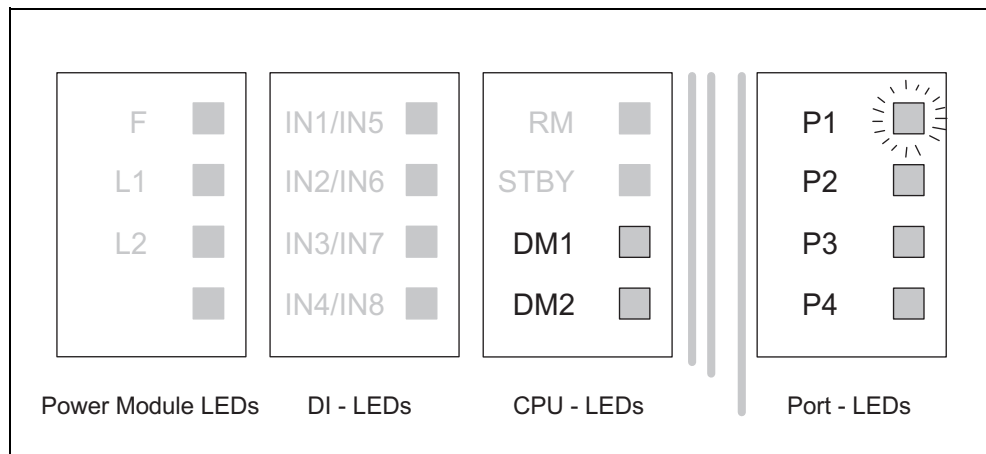


Figure 6-29 Display of the port status of port 1

Port Statuses in DMode B

In display mode B, the current transmission rate is displayed.

Port	Color	Status	Meaning
P1 P2 P3 P4		off	Port operating at 10 Mbps
	Green	on	Port operating at 100 Mbps
	Yel-low	on	Port operating at 1000 Mbps

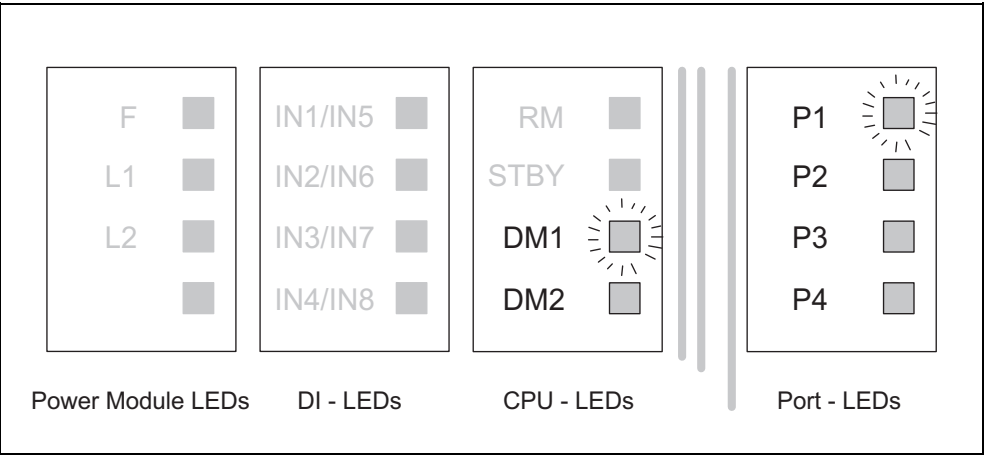


Figure 6-30 Display of the transmission rate of port 1

Note

If there is a link fault and the type of transmission is fixed (autonegotiation off), in DMode B, the desired status, in other words the set transmission rate (1000 Mbps, 100 Mbps, 10 Mbps) continues to be displayed. If there is a link fault and autonegotiation is active, the port LED goes off.

Port Statuses in DMode C

In display mode C, the current mode (half duplex, full duplex) is indicated.

Port	Color	Status	Meaning
P1 P2 P3 P4		off	Port operating in half duplex
	Green	on	Port operating in full duplex

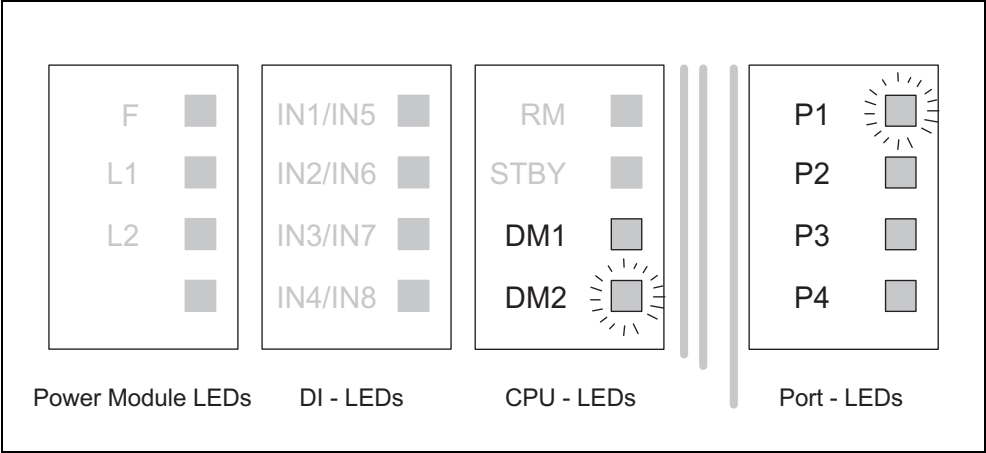


Figure 6-31 Mode display (full/half duplex) of port 1

Note

If there is a link fault and the type of transmission is fixed (autonegotiation off), in DMode C, the desired status, in other words the set type of transmission (full or half duplex) continues to be displayed. If there is a link fault and autonegotiation is active, the port LED goes off.

Port Statuses in DMode D

In display mode D, you can see whether or not the port is monitored.

Port	Color	Status	Meaning
P1 P2 P3 P4		off	The port is not monitored; in other words, if a link is not established at the port, this does not trigger the signaling contact.
	Green	on	Port is monitored; in other words, if there is no link established at the port (for example cable not plugged in or connected device turned off), this triggers the signaling contact and the fault state is adopted.

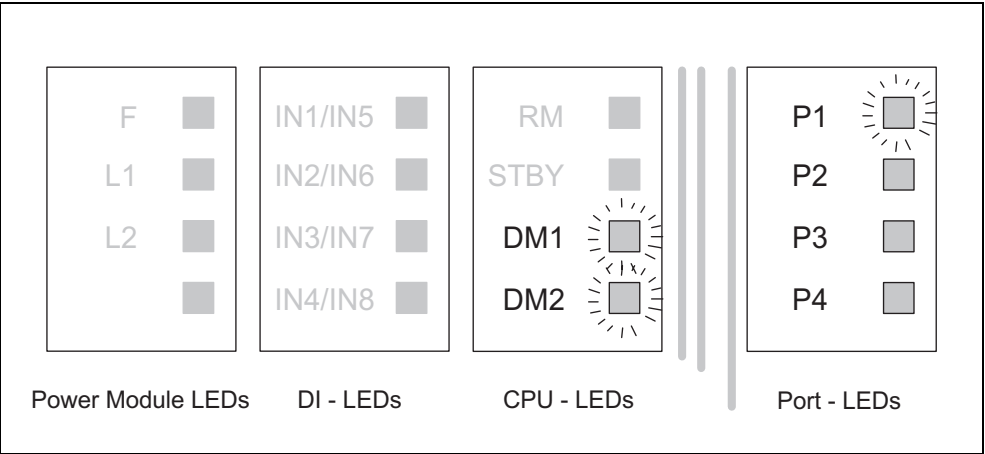


Figure 6-32 Example: Monitoring of port 1 is "on"

6.9 Replacing the C-PLUG

Removing the C-PLUG

It is only necessary to remove the C-PLUG if there is a problem on the basic device. After removing the labeling strip, the upper part of the C-PLUG can be carefully levered out of the slot on the Switch CPU using a slotted screwdriver until it can be gripped with your fingers and carefully removed.

Notice

The C-PLUG must only be removed or inserted when the power supply to the device is turned off.

Inserting the C-PLUG in the Slot

The C-PLUG is on the Switch CPU below the labeling strip. After removing the labeling strip, the C-PLUG is inserted in the receptacle with the socket connector leading. The notch in the casing must be on the right. The C-PLUG is inserted by pressing it into the receptacle until the C-PLUG is flush with the front surface of the CPU.

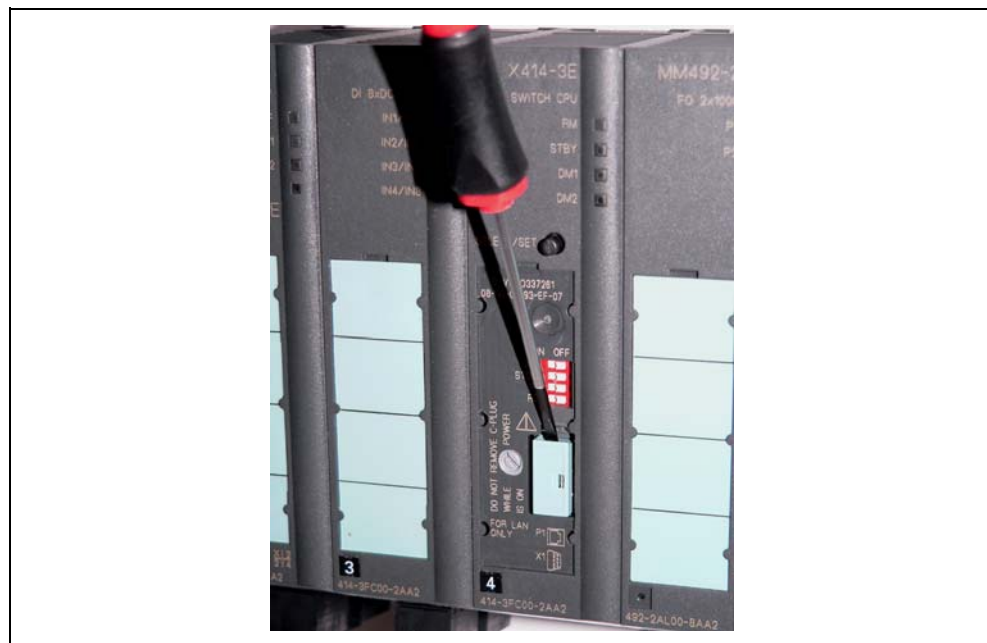


Figure 6-33 Removing the C-PLUG

6.10 Show Location

Determining the Location of a SCALANCE X-400

To identify a SCALANCE X414-3E locally and with certainty, you can use the "show location" function on a programming device to select the node over the network and make it flash. This can be used, for example, when assigning addresses to make sure that the correct node receives the address. All port LEDs of the addressed node flash green at 2 Hz.

With the PST Tool V3.0, you can trigger this function with *Module \ Ring*.

For more detailed information, refer to the *Configuration Manual SCALANCE X-400*, chapter *Working with the Primary Setup Tool*, section *Determining the location of a device*.

Technical Specifications

7

7.1 SCALANCE X414-3E

Interfaces	
Connecting end devices or network segments over twisted pair	2 x RJ-45 jack (10/100/1000 Mbps) 12 x RJ-45 jack (10/100 Mbps) All electrical ports support autonegotiation and autocrossover.
Installation of media modules	2 x slot (6 and 7) for media module types MM491-2 and MM491-2LD 1 x slot (5) for media module types MM492-2 and MM492-2LD
Installation of extender modules	1 x slot for extender module EM495-8 or EM496-4
Connector for power supply and signaling contact	2 x 4-pin plug-in terminal blocks
Connection of digital inputs	2 x 5-pin plug-in terminal blocks
Power supply (redundant inputs isolated)	2 power supplies 24 V DC (20.4 to 28.8 V) safety extra-low voltage (SELV) Power supply voltage connected over high resistance with housing (not electrically isolated). Tested to IEC 6100-4-5, 1995 "Surge Immunity Test", performed with lightning protection device DEHN Blitzductor VT AD 24V, article no. 918 402 is used
Power consumption (without modules) at 24 V DC	15 W
Current consumption at 24 V DC	< 2000 mA

Interfaces	
Load on the signaling contact	24 V DC / max. 100 mA safety extra-low voltage (SELV)
Overcurrent protection at input	Non-replaceable fuse (F 3.15 A / 250 V)
Digital Inputs	Input voltage: <ul style="list-style-type: none"> • Rated value 24 V DC safety extra-low voltage (SELV) • For state "1": + 13 V ... + 30 V • For state "0": – 30 V... + 3 V Max. input current: 8 mA Max. cable length: 30 m Inputs isolated from electronics.

C-Plug	
Dimensions (width x height x depth)	24.3 x 17.0 x 8.1 mm
Weight	approx. 5 g
Power consumption	0.015 W
Memory capacity	32 Mbytes

Permitted Cable Lengths	
TP cable length	With TP cord up to 10 m, with FastConnect cabling system up to 100 m.

Cascading Depth	
Line/star structure	Any (only depending on signal propagation time)
Ring with redundancy manager	50 (for reconfiguration time < 0.3 s)

Switching Properties	
Max. number of learnable addresses	8000
Aging time (default)	40 s
Switching procedure	Store and forward
Latency (store and forward time)	5 µs

Permitted Environmental Conditions / EMC	
Operating temperature	0°C through + 60°C
Storage/transport temperature	- 40°C through + 80°C
Relative humidity in operation	< 95% (no condensation)
Operating altitude	Max. 2000 m
Noise emission	EN 55081 Class A
Noise immunity	EN 61000-6-2 : 2001

Construction	
Dimensions (W x H x D)	344 x 145 x 117 mm
Weight	3070 g
Installation options	35 mm standard rail S7-300 rail
Degree of protection	IP 20

MTBF information (mean time between failure)

Device type	MTBF
SCALANCE X414-3E Basic device 6GK5 414-3FC00-2AA2	24.5 years
Twisted Pair extender EM495-8 6GK5 495-8BA00-8AA2	1,474.9 years
Media module extender EM496-4 6GK5 496-4MA00-8AA2	2,038.5 years
Fast Ethernet media module MM491-2 6GK5 491-2AB00-8AA2	138.3 years
Fast Ethernet media module MM491-2LD 6GK5 491-2AC00-8AA2	141.8 years
Gigabit media module MM492-2 6GK5 492-2AL00-8AA2	400.5 years
Gigabit media module MM492-2LD 6GK5 492-2AM00-8AA2	400.5 years

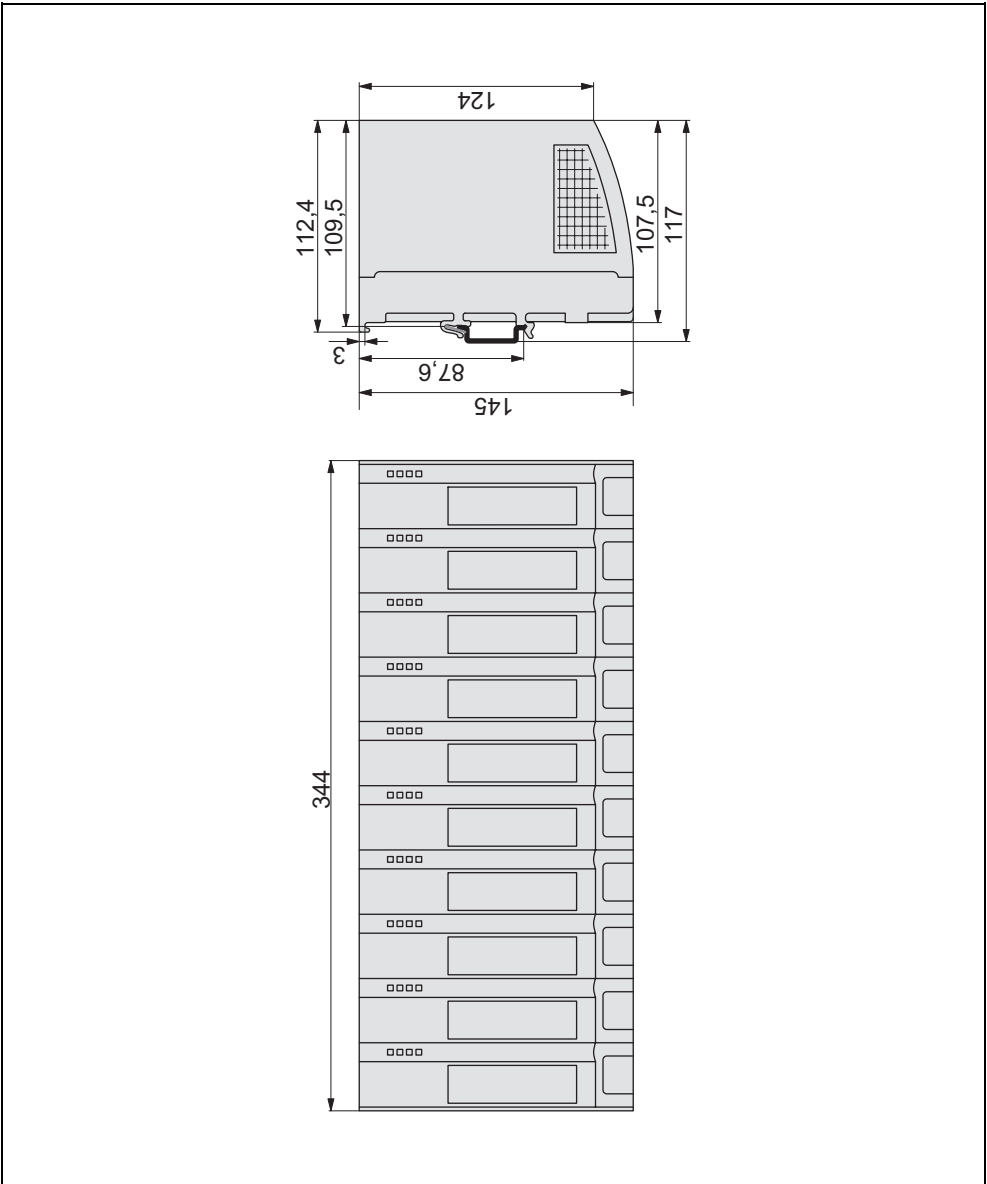


Figure 7-1 Dimension drawing - SCALANCE X414-3E

7.2 Media Module MM491-2 (100Base-FX)

Interfaces	
Connection of end devices or network segments over FOC	2x2 BFOC sockets (100 Mbps, 100BaseFX, full duplex)
Power consumption	2 W

Permitted Cable Lengths	
FOC lengths	0 – 3 km (50/125 µm multimode fiber; 1 dB/km at 1310 nm; 1200 MHz*km; 6 dB max. permitted FO cable attenuation at 3 dB link power margin)

Permitted Environmental Conditions / EMC	
Operating temperature	0°C through + 60°C
Storage/transport temperature	- 40°C through + 80°C
Relative humidity in operation	< 95% (no condensation)
Operating altitude	Max. 2000 m
Noise emission	EN 55081 Class A
Noise immunity	EN 61000-6-2 : 2001

Construction	
Dimensions (W x H x D)	35 x 145 x 90 mm
Weight	260 g
Degree of protection	IP 20

7.3 Media Module MM491-2LD (100Base-FX)

Interfaces	
Connection of end devices or network segments over FOC	2x2 BFOC sockets (100 Mbps, 100BaseFX, full duplex)
Power of the laser diode	< 2 mW
Power consumption	2 W

Permitted Cable Lengths	
FOC lengths	0 - 26 km (10/125 µm single mode fiber, 0.5 dB/km at 1310 nm; 13 dB max. permitted FO cable attenuation at 3 dB link power margin)

Permitted Environmental Conditions / EMC	
Operating temperature	0°C through + 60°C
Storage/transport temperature	- 40°C through + 80°C
Relative humidity in operation	< 95% (no condensation)
Operating altitude	Max. 2000 m
Noise emission	EN 55081 Class A
Noise immunity	EN 61000-6-2 : 2001
Laser protection	Class 1 complying with IEC 60825 -1

Construction	
Dimensions (W x H x D)	35 x 145 x 90 mm
Weight	260 g
Degree of protection	IP 20

7.4 Media Module MM492-2 (1000Base-SX)

Interfaces	
Connection of end devices or network segments over FOC	2 x SC duplex sockets (1000 Mbps, 1000BaseSX, full duplex)
Power of the laser diode	< 0.675 mW
Power consumption	4 W

Permitted Cable Lengths	
FOC lengths	0 - 750 m (50/125 µm multimode fiber; 1 dB/km at 1310 nm; 1200 MHz*km; 4.5 dB max. permitted FO cable at- tenuation at 3 dB link power margin)

Environmental Conditions / EMC	
Operating temperature	0°C through + 60°C
Storage/transport temperature	- 40°C through + 80°C
Relative humidity in operation	< 95% (no condensation)
Operating altitude	Max. 2000 m
Noise emission	EN 55081 Class A
Noise immunity	EN 61000-6-2 : 2001
Laser protection	Class 1 complying with IEC 60825 -1

Construction	
Dimensions (W x H x D)	35 x 145 x 90 mm
Weight	250 g
Degree of protection	IP 20

7.5 Media Module MM492-2LD (1000Base-LX)

Interfaces	
Connection of end devices or network segments over FOC	2 x SC duplex sockets (1000 Mbps, 1000BaseLX, full duplex)
Power of the laser diode	< 2 mW
Power consumption	4 W

Permitted Cable Lengths	
FOC lengths	0 – 10 km (10/125 µm single mode fiber, 0.5 dB/km at 1310 nm; 6 dB max. permitted FO cable attenuation at 3 dB link power margin)

Environmental Conditions / EMC	
Operating temperature	0°C through + 60°C
Storage/transport temperature	- 40°C through + 80°C
Relative humidity in operation	< 95% (no condensation)
Operating altitude	Max. 2000 m
Noise emission	EN 55081 Class A
Noise immunity	EN 61000-6-2 : 2001
Laser protection	Class 1 complying with IEC 60825 -1

Construction	
Dimensions (W x H x D)	35 x 145 x 90 mm
Weight	250 g
Degree of protection	IP 20

7.6 Extender Module EM495-8

Interfaces	
Connecting end devices or network segments over twisted pair	8 x RJ-45 jacks (10/100 Mbps) All electrical ports support autonegotiation and autocrossover.
Power consumption	< 0.5 W

Permitted Cable Lengths	
TP cable length	With TP cord up to 10 m, with FastConnect cabling system up to 100 m.

Permitted Environmental Conditions / EMC	
Operating temperature	0°C through + 60°C
Storage/transport temperature	- 40°C through + 80°C
Relative humidity in operation	< 95% (no condensation)
Operating altitude	Max. 2000 m
Noise emission	EN 55081 Class A
Noise immunity	EN 61000-6-2 : 2001

Construction	
Dimensions (W x H x D)	86 x 145 x 112,4 mm
Weight	560 g
Degree of protection	IP 20

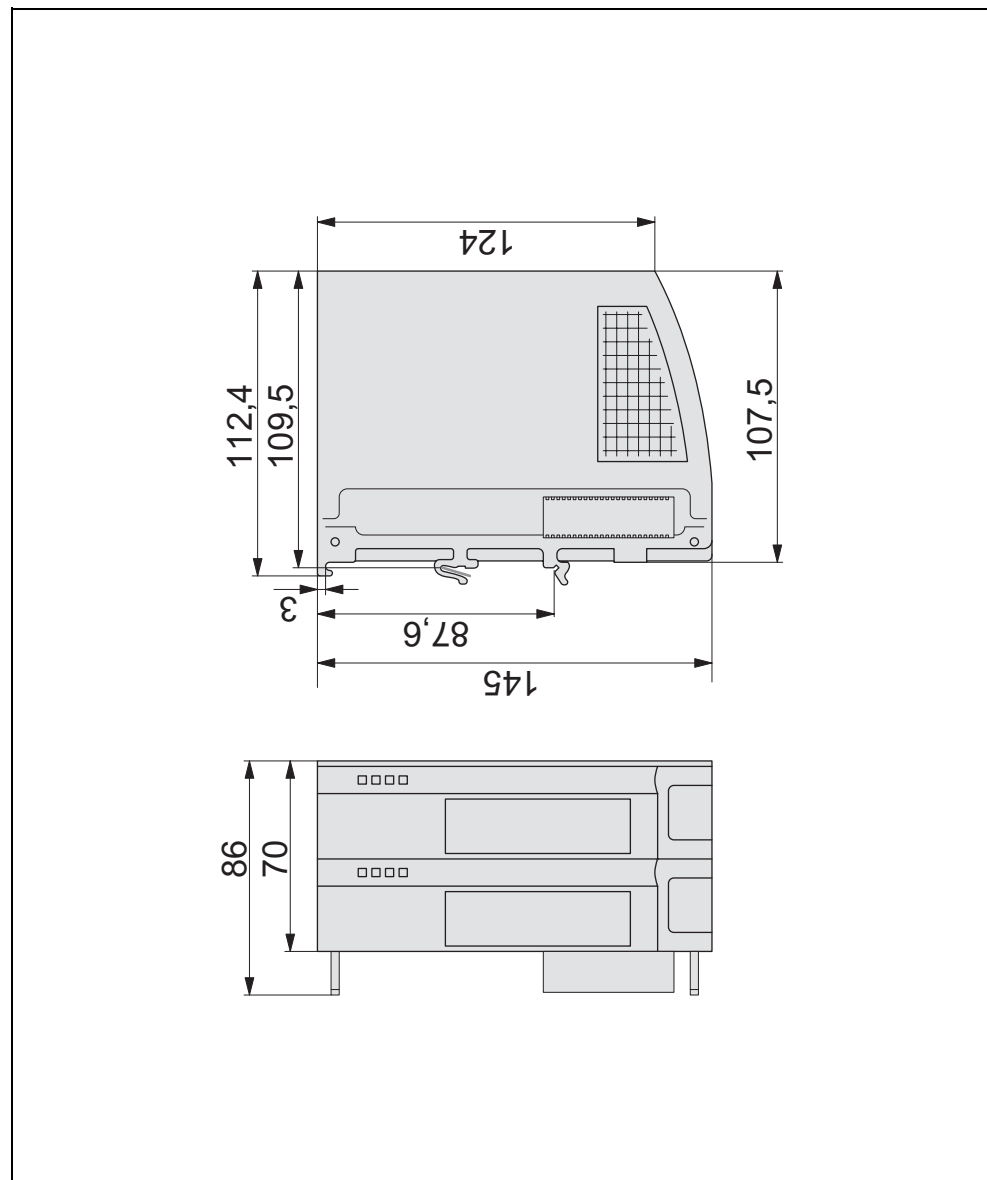


Figure 7-2 Dimension drawing - extender module EM495-8

7.7 Extender Module EM496-4

Interfaces	
Installation of media modules	4 x slots for media module MM491-2, MM491-2LD
Power consumption without media modules	< 0.5 W

Permitted Environmental Conditions / EMC	
Operating temperature	0°C through + 60°C
Storage/transport temperature	- 40°C through + 80°C
Relative humidity in operation	< 95% (no condensation)
Operating altitude	Max. 2000 m
Noise emission	EN 55081 Class A
Noise immunity	EN 61000-6-2 : 2001

Construction	
Dimensions (W x H x D)	154 x 145 x 112,4 mm
Weight	980 g
Degree of protection	IP 20

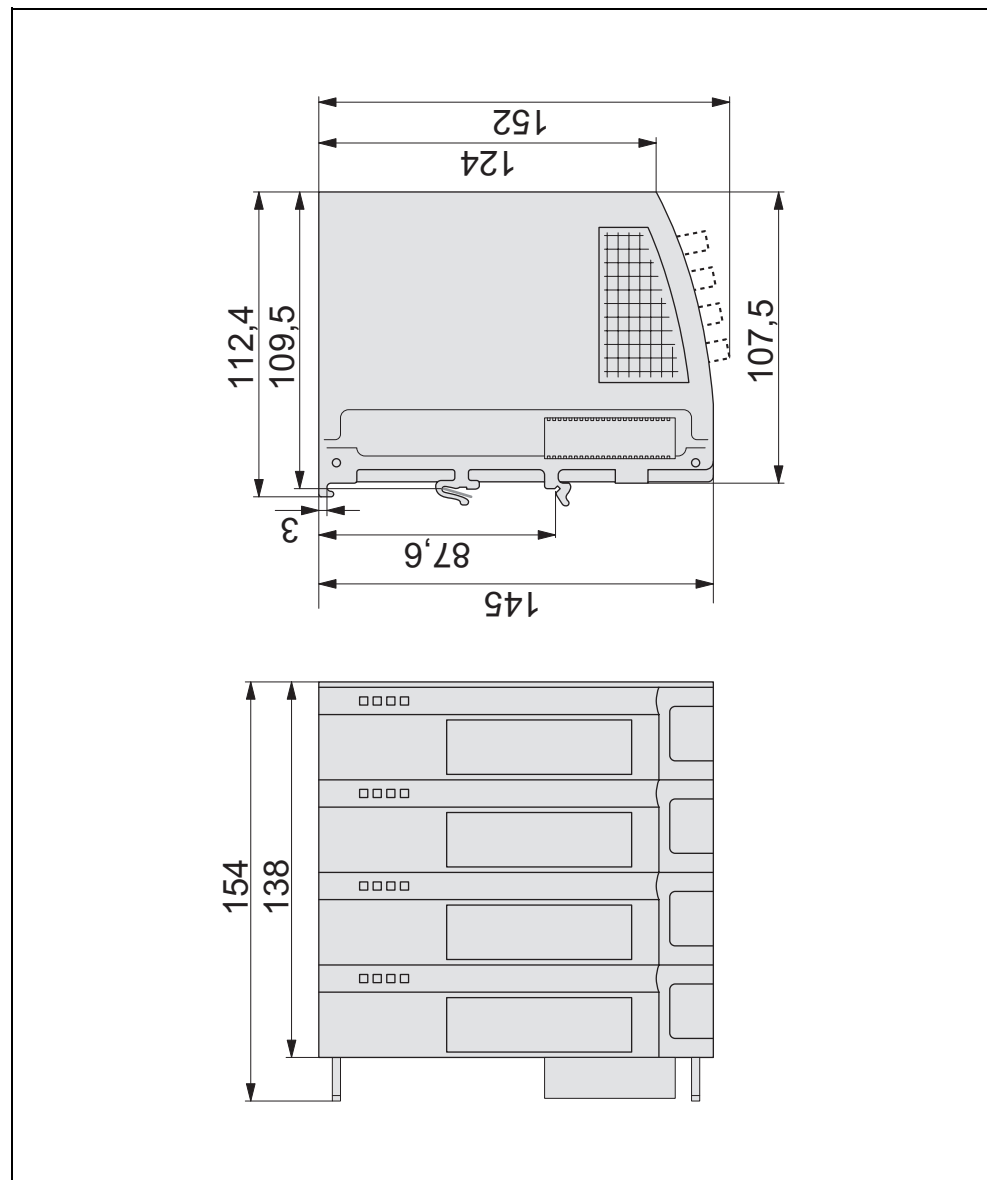


Figure 7-3 Dimension drawing - extender module EM496-4

Approvals, Certificates

Note

The specified approvals apply only when the corresponding mark is printed on the product. You can check which of the following approvals have been granted for your product by the markings on the type plate.

CE Marking

SIMATIC NET SCALANCE X-400 Industrial Ethernet switches meet the requirements and aims of the following EU directives and comply with the harmonized European standards (EN) for programmable logic controllers published in the Official Journal of the European Communities:

- Directive 89/336/EEC "Electromagnetic Compatibility" (EMC Directive)
- Directive 73/23/EEC "Electrical Equipment Designed for Use within Certain Voltage Limits" (Low Voltage Equipment Directive)
- Directive 94/9/EEC Equipment and Protective Systems intended for Use in Potentially Explosive Atmospheres (Explosion Protection Directive).

The EU declarations of conformity are available for the responsible authorities according to the above-mentioned EU directive at the following address:

Siemens Aktiengesellschaft
Automation and Drives
Industrial Communication SIMATIC NET
Postfach 4848

D-90327 Nuernberg, Germany

EMC Directive

The products are designed for use in an industrial environment:

Area of Application	Requirements	
	Noise emission	Noise immunity
Industry	EN 61000-6-4 : 2001	EN 61000-6-2 : 2001

Explosion Protection Directive

Complying with EN 50021 (Electrical apparatus for potentially explosive atmospheres; Type of protection “n”)

II 3 G EEx nA II T3...T6

Note

When using (installing) SIMATIC NET products in hazardous area zone 2, make absolutely sure that the associated conditions are adhered to.

You will find these conditions on the SIMATIC NET Manual Collection CD.

Required FDA and IEC labels

The listed media modules meet the FDA and IEC requirements.

- MM491-2LD
- MM492-2
- MM492-2LD



Figure 8-1 FDA and IEC labels

FDA and IEC labels are not required for media module MM491-2.

Directive on Machines

The product remains a component in compliance with Article 4 (2) of the EU directive on machines 89/392/EEC.

According to the directive on machines, we are obliged to point out that the product described is intended solely for installation in a machine.

Before the final product can be put into operation, it must be tested to ensure that it conforms with the directive 89/392/EEC.

Note for the Manufacturers of Machines

This product is not a machine in the sense of the EU directive on machines. There is therefore no declaration of conformity for the EU directive on machines 89/392/EEC.

If the product is part of the equipment of a machine, it must be included in the procedure for obtaining the declaration of conformity by the manufacture of the machine.

Installation Guidelines

The products meet the requirements if you adhere to the installation and safety instructions contained in these Operating Instructions SIMATIC NET Industrial Ethernet SCALANCE X-400 and in the following documentation:

SIMATIC NET Industrial Twisted Pair and Fiber Optic Networks Manual /2/

This documentation is available on the Internet at
<http://support.automation.siemens.com/WW/view/en/8763736>



Warning

Personal injury and damage to property may occur.

The installation of expansions that are not approved for SIMATIC NET products or their target systems may violate the requirements and regulations for safety and electromagnetic compatibility.

Only use expansions that are approved for the system.

Note for Australia

The product complies with the requirements of the AS/NZS 2064 standard (Class A)

UL Approval Information Technology Equipment

Underwriters Laboratories (UL) complying with Standard UL 60950-1

Report number E115352

UL Approval Industrial Control Equipment

Underwriters Laboratories (UL) complying with Standard UL 508

Report number E85972

CSA Approval Information Technology Equipment

CSA-Certification-Mark

Canadian Standard Association CSA C22.2 No. 60950-1-03

CSA Approval Industrial Control Equipment

CSA-Certification-Mark

Canadian Standard Association CSA C22.2 No. 14-M91

cULus Approval Information Technology Equipment

cULus Listed 60E9 I. T. E.

Underwriters Laboratories Inc. complying with

- UL 60950-1 (Information Technology Equipment)
- CSA C22.2 No. 60950-1-03

cULus Approval Industrial Control Equipment

cULus Listed 69B1

Underwriters Laboratories Inc. complying with

- UL 508
- CSA C22.2 No. 14-M91

cULus Approval Hazardous Location

cULus Listed 21BP I. T. E. FOR HAZ. LOC.

Underwriters Laboratories Inc. complying with

- UL 60950-1 (Information Technology Equipment)
- CSA C22.2 No. 60950-1-03
- UL 1604 and 2279 (Hazardous Location)

Approved for use in

Cl. 1, Div. 2, GP. A, B, C, D, T4

Cl. 1, Zone 2, GP. IIC T4

Cl. 1, Zone 2, Aex nC IIC T4

Note

When used in environments corresponding to Class I, Division 2 (see above), the product must be installed in a cabinet, a suitable enclosure, or closed room.



Warning

In hazardous areas, personal injury or damage to property may occur if you make or break an electrical circuit while a SCALANCE X-400 is in operation.

Do not connect or disconnect any live circuits unless risk of explosion can be excluded with certainty.

FM Approval

The product complies with the requirements of the standards

- Factory Mutual Approval Standard Class Number 3611
- FM Hazardous (Classified) Location Electrical Equipment:
Non Incendive / Class I / Division 2 / Groups A,B,C,D / T4 and
Non Incendive / Class I / Zone 2 / Group IIC / T4

ATEX Approval

The product complies with the requirements of the standard

- EN50021



Warning

Use under Zone 2 (or Div. 2) Ex-protection conditions requires the installation in a housing. The housing has comply with class IP 54 according to standard EN 60529, in the scope of the EU directive 94/9 (Atex 100a).

Certification

The products and systems listed in this document are manufactured and marketed using a quality management system complying with DIN ISO 9001 and certified by DQS (certificate registration no. 2613). The DQS certificate is recognized in all IQNet countries (Reg. no. 2613).

Devices connected to the system must meet the relevant safety regulations.

The EU declaration of conformity is available for the responsible authorities according to the above-mentioned EU directive at the following address:

Siemens Aktiengesellschaft
Automation and Drives
Industrial Communication SIMATIC NET
Postfach 4848

D-90327 Nuernberg, Germany

This declaration certifies compliance with the directives named above, but does not guarantee any specific properties.

Glossary

Aging time	The aging time is the time after which a learned MAC address is discarded if a SCALANCE X-400 has not received frames with this sender address during this time.
Autocrossover	Technique with which a TP port is automatically switched over between MDI and MDI-X assignment to make a connection independent of the port assignment of the device being attached. This means that cross-over cables are not required. The autocrossover function can only be used when the port is set to autonegotiation mode.
Autonegotiation	Procedure standardized by IEEE 802.3 in which the transmission parameters (for example 10/100 Mbps, full/half duplex) are negotiated automatically between the devices.
C Plug	The C-PLUG (configuration plug) is an exchangeable memory medium of storing the configuration data. If the device is replaced, the configuration can be adopted by swapping the C-PLUG.
CLI	Command Line Interpreter. Terminal-based configuration option for the SCALANCE X-400. The CLI can be used both over the serial port of the Switch CPU and with TELNET over every Ethernet port.
Collision domain	To ensure that the CSMA/CD protocol functions correctly, the propagation time of a data packet from one node to another is restricted. This propagation time results in a spatially limited span for the network depending on the data rate known as the collision domain.

Connection monitoring	With regular link test pulses, SCALANCE X-400 monitors the connected TP and FO cable segments for short-circuits or interruptions. The SCALANCE does not send data to a segment from which it is not receiving link test pulses.
Digital input	A digital input is used to acquire binary file information. A state change can be logged in the Log Table or reported by E-mail or traps. The voltage levels between – 30 V and + 3 V correspond to logical state "0", voltage levels between + 13 V and + 30 V correspond to logical state "1".
Dispersion	Broadening and distortion of light pulses in fiber-optic cable due to signals arriving at different times. On multimode FOC, the distortion of the output signal is greater than with single mode FOC.
Display Mode (DMode)	Display mode that indicates various statuses (port status, power monitoring activated etc.). The modes can be switched over using a button on the Switch CPU.
ESM	E lectrical S witching M odule – SIMATIC NET Ethernet switch with electrical ports.
Fault mask	Specifies the desired status (good status). Deviations from this occurring during operation are handled as faults.
FO port	F iber- O ptic P ort
Full duplex	Two-way simultaneous - both communication partners can send and receive at the same time.
Half duplex	Two-way alternate transmission mode- it is only possible to either send or receive over the interfaces at any one time.
Latency	Latency specifies the time taken by frames to pass through a switch. This does not include the time required for buffering frames.
Load Containment	With its filtering functions, a switch makes sure that local data traffic remains local. The local network load of a segment is contained in the originating segment and does not represent extra load on the remainder of the network.

MDI	Medium Dependent Interface , - straight On an MDI port or MDI cable, the receive (Rx) and the send (Tx) leads are not crossed.
MDI-X	Medium Dependent Interface – crossover, On an MDI-X port or MDI-X cable, the receive (Rx) and the send (Tx) leads are crossed.
MIB	Management Information Base . The MIB is a formal description of network objects in the form of a tree structure that contains all the relevant information for network management in SNMP.
Mirroring	A port (mirror port) with its specific data traffic can be mirrored to another port (monitor port) for test purposes. Protocol analysis devices can be connected to the monitor port, in other words, the monitor port is not available for data exchange. Mirroring has no effect on the mirror port.
Modes	Modes are discrete waves used to transmit data within a fiber-optic cable. With single mode fibers, only one wave propagates, whereas in multimode fibers several waves propagate. Modes are patterns of electromagnetic fields in FOCs.
Multimode	In multimode transmission, the pulse is transferred using many modes (waves) that travel along curved paths or are reflected within the core. Attenuation is mainly caused by physical absorption and dispersion as well as by mechanical bending. The amount of attenuation depends among other things on the wavelength of the input light. Multimode fiber-optic cables have an outer diameter of 125 µm and 50 or 62.5 µm core diameter. Due to the larger core diameter the pulse edges degrade more than in single mode transmission resulting in shorter transmission distances.
OSM	Optical Switching Module – SIMATIC NET Ethernet switch with optical ports.
Rapid spanning tree	The Rapid Spanning Tree protocol (RSTP) allows redundant transmission paths. This prevents circulating frames and, if a fault develops, provides an alternative path within one second (reconfiguration time).
Reconfiguration time	The time required to restore a functional configuration if a device fails or a network cable is interrupted.

Redundancy manager (RM)	Switch in a ring topology that does not forward any frames between its ring ports if there are functioning connections between all other switches. As soon as a connection between two switches is interrupted, the redundancy manager forwards frames between its ring ports and so restores an intact connection between all switches.
Ring port	Two ports in a switch via which it is connected with other switches to form a ring. One switch must be configured as the redundancy manager in the ring. This sends test frames via the ring ports that are forwarded by all the ring ports of the other switches in the ring. This makes sure that the ring does not have any interruptions.
Segment	In the Ethernet bus system, transceivers connected together over the bus cable along with the nodes connected over patch cables form a segment. Several such segments can be connected via repeaters. When using twisted pair and fiber-optic cables, each subsection forms a segment.
Signaling Contact	Floating relay contact via which the detected error states can be signaled.
Single mode	In single mode transmission, the pulse is transmitted by a straight mode (wave). Attenuation is mainly caused by physical absorption and dispersion as well as by mechanical bending. The amount of attenuation depends among other things on the wavelength of the input light. Single mode fiber-optic cables have an outer diameter of 125 µm and 9 or 10 µm core diameter. The smaller core diameter degrades the pulse edges less than multimode transmission and allows greater transmission distances.
SNMP	S imple N etwork M anagement P rotocol. Standardized protocol for transporting network management information.
Spanning Tree	The Spanning Tree protocol (STP) allows redundant transmission paths. This prevents circulating frames and, if a fault develops, provides an alternative path within 20 - 30 seconds (reconfiguration time).

Store and forward	In this switching technique, the entire frame is read in, before it is forwarded by the switch. A packet is only passed on if it is error-free.
TELNET	With this protocol, an interactive connection can be established to another device in the LAN or on the Internet. The user then has the same options as when directly connected to this device with a terminal.
TP Port	Port with a TP connector (RJ-45 jack)
VLAN	Virtual LAN within a physically existing network.

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A&D Technical Support

Worldwide, available 24 hours a day:



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Europe / Africa (Nuernberg) Authorization Local time: Mon.-Fri. 8:00 to 17:00 Phone: +49 (0) 180 5050-222 Fax: +49 (0) 180 5050-223 Internet: www.siemens.de/automation/support-request GMT: +1:00	United States (Johnson City) Technical Support and Authorization Local time: Mon.-Fri. 8:00 to 17:00 Phone: +1 (423) 262 2522 Fax: +1 (423) 262 2289 E-Mail: simatic.hotline@sea.siemens.com GMT: -5:00	Asia / Australia (Beijing) Technical Support and Authorization Local time: Mon.-Fri. 8:00 to 17:00 Phone: +86 10 64 71 99 90 Fax: +86 10 64 74 74 74 E-Mail: adsupport.asia@siemens.com GMT: +8:00
The languages of the SIMATIC Hotlines and the authorization hotline are generally German and English.		

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